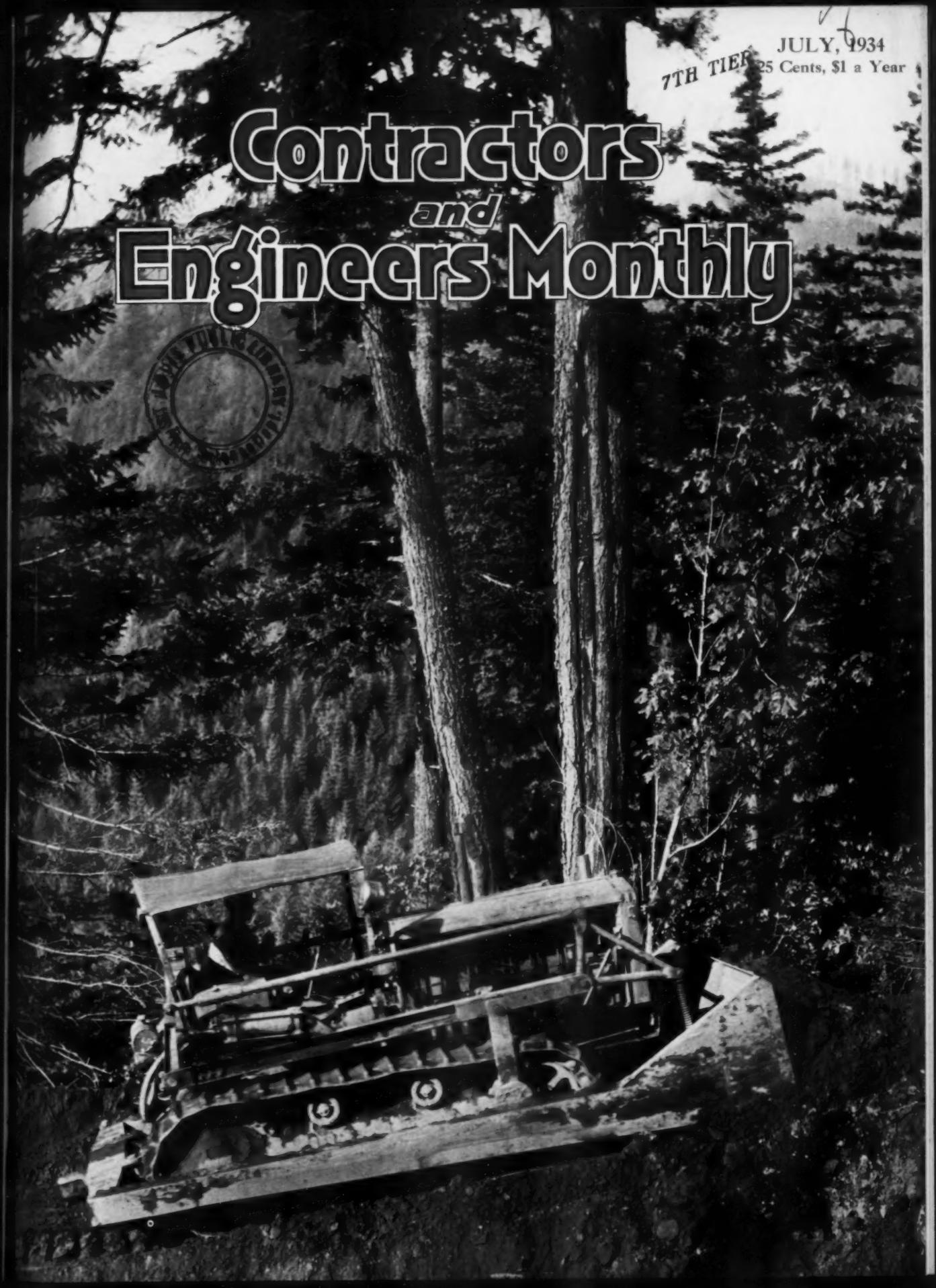
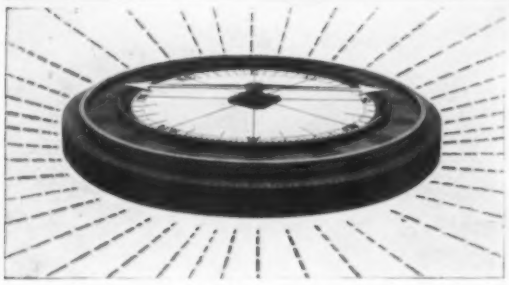
JULY, 1934
7TH TIER 25 Cents, $1 a Year

Contractors and Engineers Monthly



Rainy Days are Working Days..



Because of the separate circular base, an exclusive Bucyrus-Monighan feature, the Walker can step off in any one of an infinite number of directions.

because the WALKER DOESN'T MIRE!

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B-50

The Operation *of a* Mixed-In-Place Contract

By
Charles C. Chesley
Construction Engineer
D. W. Overocker,
Contractor

LOW-COST no longer means a carelessly thrown together road surface. It was not so long ago that engineers and also contractors considered that inspection and careful construction were totally unnecessary with the cheaper types of roads. Today in the preparation of the base, in the selection of aggregates, and in every step through to the finished surface, the contractor takes infinite care and the representative of the state inspects the work diligently, resulting in a highway which costs practically no more than the old "cheap" type but one which will give infinitely more service measured in years or ton-miles of traffic carried.

Among the group of mixed-in-place contracts awarded during the last year by the State Highway Department of Vermont was one of 6 miles on State Route 15 between Essex Junction and Jericho, the western end being located about 7 miles from Burlington on Lake Champlain. This was an 18-foot road with 4-foot shoulders, the contract for the surfacing of which was awarded to D. W. Overocker of Burlington, Vt., on August 7, 1933. Work was started on August 11 and the placing of aggregate began September 20. Actual mixing of the surface began September 25 and was completed October 12, 1933.

The first stage of construction, namely the preparation of the grade, was done under an earlier contract by the same organization during October, November and December, 1932. Hand labor was required for leveling fills and gravel but the final trimming was done by a grader. A crew of five men was used to level the fills and five men in leveling the gravel.

Newly Developed Equipment and Hand Labor Operated Together on Vermont Job

The Base Course

The base or shaping course required a total of 8,000 yards of gravel varying in depth over the entire length of the project from 0.1 to 0.5-foot. This material was stone excavated from river bars and had to be 50 per cent stone by weight retained on a ¼-inch screen; not less than 25 per cent retained on a 1½-inch screen and all stone passing a 3-inch screen. This material was merely used to bring the subgrade or base to the specified elevation with a material which would furnish a stable foundation.

The base was continually worked by a large Adams grader and allowed to compact under traffic until hard. The final shaping was done by the Caterpillar grader and then the base was rolled just before the application of a tack coat of from 0.3 to 0.4-gallon per square yard of Koppers tar. Holes which developed in the tack coat before the surface was mixed were filled with a cold mix of gravel and tar, using about 100 gallons of

tar mixed with 2 cubic yards of gravel.

PLACING THE AGGREGATE FOR THE SURFACE COURSE

All of the aggregate for the mixed-in-place surface course was produced by the contractor and was excavated from a gravel bar in the Winooski River and screened and washed in an Acme portable road plant. The material was not crushed. Approximately 4,400 cubic yards of material was used, consisting of pea stone from ¼ to ¾-inch, the stone for the mix varying from ¾ to 1¾ inches with not less than 25 per cent retained on a 1-inch screen. The material was hauled from the plant an average distance of 5¼ miles to the road, using ten 4-yard International trucks hired by the contractor.

The aggregate for the mixed-in-place surface was placed on the road by two Galion spreader boxes, one at either side of the road. These were attached to the trucks as they reached the site of operations and the material spread to a uniform depth of 3½ inches. The box on the left side was always kept at least 75 feet ahead of the right-hand box to allow traffic to pass. Another reason for keeping the left-hand box ahead was that the driver of the truck pulling the left-hand box could better follow the edge of the road. Then, when the right-hand box was brought up, the driver of the truck pulling that could follow the edge of the stone already placed by the left-hand box. To prevent loss of aggregate which occurred in the first few days' operations, the stone was spread 1 foot in from the edge of the final traveled way and worked out to the required width by the road mixer. There was little scattering of the stone as each day's run or spread of stone was mixed the following day. Only two men in addition to the truck drivers were required for spreading the stone, their chief duties being the hitching and unhitching of the stone boxes to the trucks.

APPLICATION OF THE ROAD OIL

For the tack coat and the surface mix, Koppers tar of 40 viscosity was used throughout. The tar was delivered to a siding near the middle of the job in tank cars and was hauled from the tank cars by two 835-gallon Hvass distributors mounted on International chassis. The tar was hauled and applied by Koppers Products Co. The average length of haul was about 1¾ miles.

The temperature of the tar in the jacketed tank car on its arrival at the siding was about 135 degrees Fahrenheit. This temperature was boosted to 150 degrees in the distributor for application to the aggregate. The tar was distributed to the road in two applications, the first of 0.6 gallons per square yard and the second of 0.3 to 0.4 gallons per square yard with road mixing between the two applications.

THE ROAD-MIX OPERATION

After the first application of tar, a Galion No. 20 mixing and leveling maintainer pulled by a 5-yard Linn tractor made two trips over the 3,500 feet of road which was the average length of strip, 10 feet wide, handled as a unit for the mixing operation. Similarly two trips were made over the strip after the second application of tar and occasionally a third trip was required to insure complete mixing. This same machine on another contract mixed crushed stone thoroughly, with one trip of the machine to each operation. The mixing and leveling drag consists of a heavy four-wheel structural steel frame carrying in succession from front to rear: a pair of 20-inch moldboards set at 40 degrees from the center line of the machine which roll the material toward the center; then a V-plow which similarly mixes the material and distributes it toward the sides; behind the plow, another pair of mixing blades again mixing the material and rolling it toward the center; a short V-plow to spread the material and a rear strike-off adjustable for crown and equipped with a plumb bob giving the final spread and finish.

In addition to the precaution mentioned above of spreading the stone only to within 1 foot of the edge of the finished surface, to prevent the aggregate from running over on to the shoulder, a solid panel was bolted about mid-way on the right-hand side of the open framework of the Galion mixer to prevent the stone from further spilling out onto the shoulder. The Caterpillar Thirty was hooked on to the rear of the mixer on curves to prevent the machine from sliding to the inside of the curve. The material was mixed for the full depth of the aggregate down to the tack coat and three men operated the mixer.

Inasmuch as the best operation of the mixer was secured when it was carrying with it several yards of the material in process of mixing along the road, it was necessary to start the machine with a pile of fairly well-mixed aggregate and tar at the beginning of each 3,500-foot run and also to have a pit at the end of the run where the machine would unload or leave the volume of mixed material which it was carrying. In a round trip of 3,500 feet, it was necessary to have two piles of mixed material and two pits. Four men were kept busy during mixing operations digging these pits and making the piles of mixed aggregate.

Through traffic was completely diverted from the road during mixing. A grader was used after mixing was completed at the end of each day to smooth the ends of the mix and on banked curves to work the material up onto the high side as it had a tendency to work down during the mixing operations. The road was rolled once immediately after the completion of the mix and then daily for three or four days until all ruts caused by traffic were ironed out. It was found that too much rolling immediately after mixing produced waves. A Buffalo-Springfield 12-ton gas roller was used for compacting the surface.

SANDING, BRUSHING AND APPLYING THE SEAL COAT

When the surface was sufficiently rolled to be smooth and hard, sand was spread from the 4-yard trucks moving at 25 miles per hour with the tail-gates chained to a 1-inch opening. Three widths of spreading were necessary to cover the full 18-foot width of traveled surface. One load of sand would cover a strip about 2,000 feet long. The dump body of the truck was raised to the full height and the maximum spreading speed of a truck was reached before it arrived at the place where sanding was to start. A man standing on the running board of the truck tripped the gate at the desired point.

The sand was thoroughly brushed into all voids along the completed mixed-in-place surface by a home-made gang brush hauled by a truck at a low rate of speed.

The brush was so designed, as shown in one of the illustrations, that one diagonal set of brushes could be removed to permit working excess sand to the edge of the road before putting on the seal coat.

As soon as the excess had been removed to the edge of the road and swept off by hand, a seal coat of 0.25 gallons per square yard of the road tar was applied. The sweeping of the excess sand from the edge of the road was done by eight men who covered the 6-mile stretch in two days. Immediately after applying the seal coat, pea stone was spread in the same manner as the sand was spread, with the trucks traveling at the rate of 15 miles per hour with the tail-gate opened 2 inches. A 4-yard load of pea stone covered a strip 1,000 feet long and 6 feet wide so that three trips were necessary to cover the whole 18-foot width of the pavement. To insure an even coating of stone a whip drag was made of three old diamond-shaped lengths of wire fence guard fastened to a piece of 2 x 4 at either end and towed slowly behind a truck. When the pea stone had been distributed uniformly the road was again rolled, completing the surfacing operations. Six men built all the shoulders, using borrow free of coarse stone.

PERSONNEL

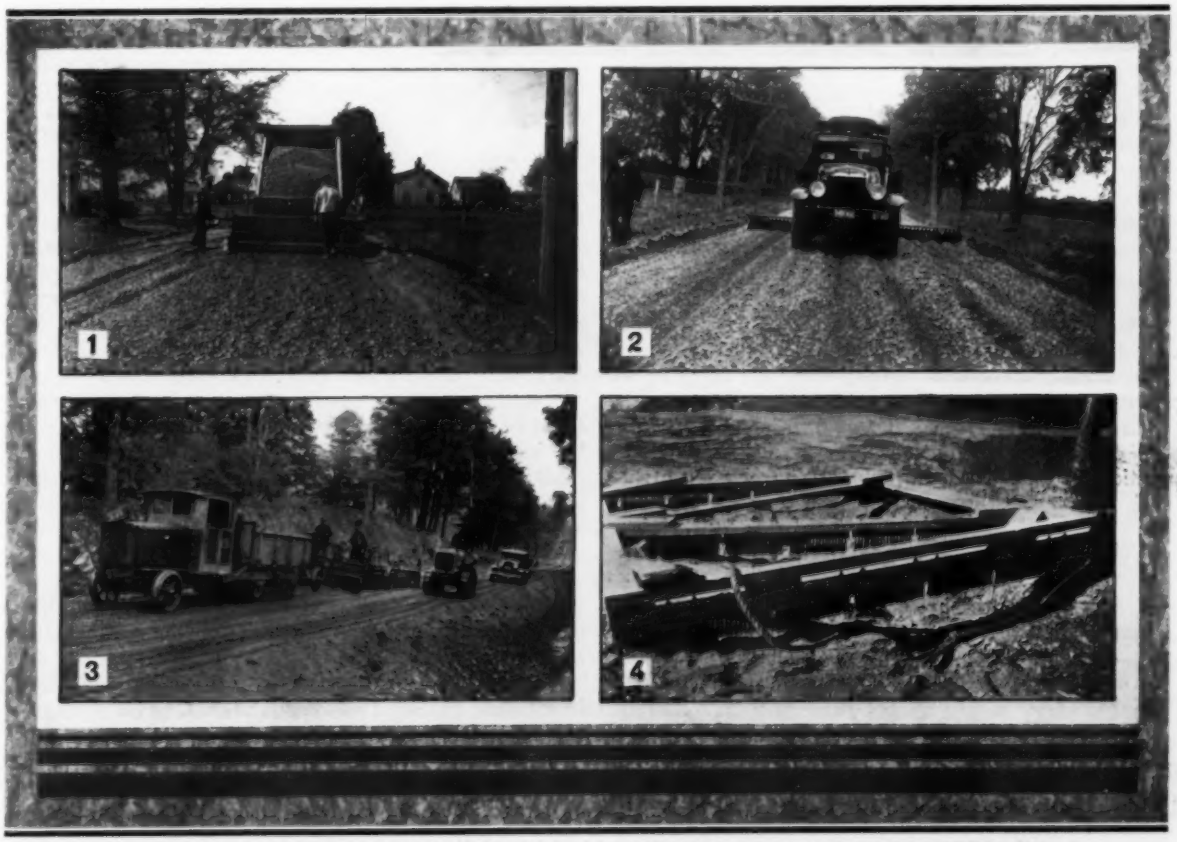
This 6-mile mixed-in-place contract was handled entirely by D. W. Overocker of Burlington, Vt., with Mr. Overocker acting as his own Superintendent and the author as Construction Engineer for the contractor. For the Vermont Department of Highways, George Tutheriy was Resident Engineer.

Revised Edition of Welding Handbook

A REVISED and enlarged edition of *Procedure Handbook of Arc Welding Design and Practice* has been announced by the Lincoln Electric Co. This new volume is greatly enlarged and encyclopedic in scope and contents. It contains over 450 pages with several hundred illustrations and is divided into eight principal sections, which deal with the various phases of arc welding in a simple, concise manner, well illustrated with detailed drawings and photographs. The book is designed especially for the use of designers, engineers, welding operators, welding foremen and engineers responsible for the design of products which may be redesigned for welding construction. Copies of this Handbook may be secured from the Lincoln Electric Co., Cleveland, Ohio. Price: $1.50 each.

Our Front Cover

The illustration reproduced on our front cover shows a Caterpillar diesel Seventy-Five tractor and Master bulldozer building a new road in Skamania County, Wash. This farm-to-market road was built through heavy red and black clay by George Hazard, Contractor, of Spokane, Wash.



STEPS IN PRODUCING A MIXED-IN-PLACE SURFACE ON A VERMONT HIGHWAY

1. Spreading screened and washed river gravel for the surface course with a spreader box. 2. The first application of 40-viscosity tar. 3. A 5-yard tractor pulling the mixing and leveling machine with a crawler tractor pulling laterally to hold the machine on a curve. Note the traffic ready to pass the operation at the first opportunity. 4. The home-made gang brush used to push sand into all voids of the completed mixed-in-place surface.

The Lubrication *of* Motor Trucks

The Seventh of a Series of Articles on an Important Phase of the Maintenance of Construction Equipment

THE motor truck is an indispensable part of the contractor's mechanical equipment. It has influenced the creation and development of other mechanical units employed in excavation more than any other factor. Its ability to handle increased yardage of earth and stone has permitted the physical modification of other machinery that their work might be speeded up to their maximum capacity.

Regardless of size, motor trucks invariably are operated at high speeds and required to carry loads in excess of their rated capacity. To maintain their efficiency, it is necessary that they receive the best of care and attention by those who are responsible for their operation. It too frequently happens that motor trucks are more or less neglected, due possibly to the fact that they are required to operate continuously for long periods without stopping, shortening the time available for proper inspection to correct any slight defects which may develop from day to day.

In view of the excessive duty they are required to perform, it is most important that they be correctly and thoroughly lubricated at stated intervals that they may operate efficiently at all times. It is common practice for an operator to defer the lubrication of his truck as long as it continues to roll over the roads at desired speeds, without developing most discernible squeaks in one or more bearings. It is a fallacy to believe there is no wear on bearings if such squeaks do not develop to a perceptible degree. It is quite common for bearings to operate quietly without a protecting film of lubricant between the bearing surfaces, especially when the bearings are somewhat worn. Then again, the tell-tale squeak may be in evidence but its cry may be deadened by rattling and banging noises developed by the operation of the truck.

A Normal Operating Condition

The Penalty of Faulty "Greasing"

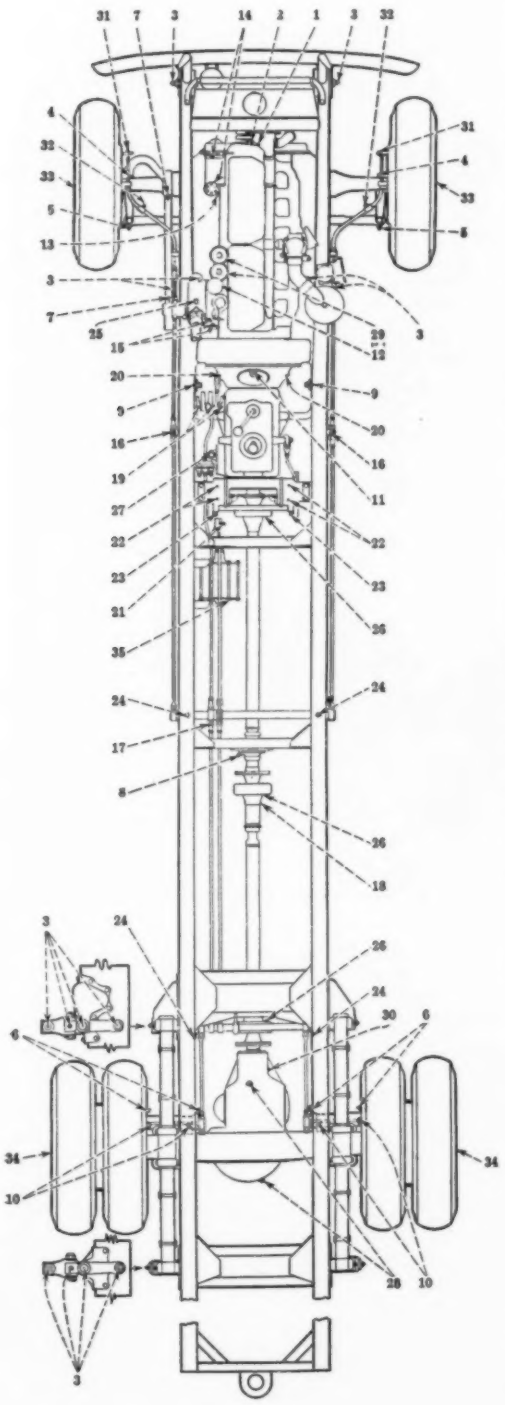
One superintendent of equipment, in charge of a large fleet of trucks for a prominent contractor, recently made the statement that at least 90 per cent of his repairs could be attributed to improper or inefficient lubrication while his trucks were in the field. He added that such repairs, with the attendant replacement of parts, far exceeded what labor and lubricants would cost if each truck were properly lubricated each day.

Operators of light trucks are very likely to place them in the same category as pleasure cars, as far as lubrication is concerned. They overlook the fact their machines are built of heavier materials to withstand hard usage and their net weight is far in excess of the average automobile, without consideration of the gross weight when operating under normal loads. These conditions require more frequent attention on the part of those responsible for their lubrication, that the life of bearings may be prolonged the maximum length of time.

Very few operators appreciate the effect inefficient lubrication has on fuel consumption, but it is an established fact that 3 per cent of bearing area inefficiently lubricated increases the total frictional load at least 12 per cent, with a corresponding increase in fuel consumption. This increased consumption of fuel is invariably attributed to increased loads hauled or higher speeds of operation over the roads and is generally accepted as a necessary expense for the accomplishment of a purpose. When traced to actual causes, it will develop that lack of proper lubrication at certain im-

portant points was responsible.

As stated before, it frequently is necessary to operate heavy-duty trucks overtime and practically continuously to facilitate the handling of material on certain jobs. Under such circumstances there is an inclination to procrastinate on the part of those who are charged with the responsibility of lubricating the equipment, or to overlook those parts which are more or less inaccessible, with all good intentions of caring for them as soon as time will permit. It is not unusual for such neglected bearings to become burned out or ruined before a suitable opportunity may present itself to give them proper care. This not only results in expensive repairs and replacements, but incurs the loss of truck service while such repairs are being made. In cases of this character, it is seldom that the responsibility is charged



Every 500 Miles

1. Water Pump — Fill oil cup with engine oil.
2. Fan Hub
3. Spring Pins and Shackles
4. Steering Knuckles
5. Tie Rod Ends
6. Rear Brake Camshafts
7. Steering Drag Link Ball Joints
8. Propeller Shaft Center Bearing
9. Engine Rear Support Beam Bolts
10. Rear Brake Rocker Shafts

— Use recommended grease.

> **Note**
> Oil the brake rod yokes, levers, and pins frequently with engine oil, for easy brake operation.

11. Clutch Throw-out Bearing — Use recommended grease. Two turns with gun completely filled.

Magneto (special) — 2 or 3 drops light machine oil in oil cup. *Keep oil from interrupter contacts.* If not provided with oil cups, bearings are then packed in grease sufficient to last over a long period or until magneto requires a general inspection.

Every 500 to 1000 Miles

12. Engine — Drain and refill with new engine oil. Cold weather requires new oil more often because of using choke, which thins oil. Keep engine oil to proper level. In winter use Medium oil, or S.A.E. No. 20. In summer use Extra Heavy Oil, or S.A.E. No. 50.

Spring Leaves — Use engine oil. Paint edges with a small stiff brush or use a spray gun. Don't wash truck until oil has worked between leaves.

Every 1000 Miles

13. Distributor — Fill cup with recommended grease and turn down one turn. Apply drop of engine oil to breaker arm pivot, also to wick under rotor. Apply small quantity vaseline to breaker arm.
14. Generator — 8 to 10 drops light engine oil in hinged cap oilers. Fill gear compartment with graphite grease having 5% or more graphite, at least every 6 months.
15. Starting Motor — 8 to 10 drops engine oil in hinged cap oiler. Remove plug in case and repack with graphite grease having 5% or more graphite, at least every 6 months.
16. Front Brake Relay Levers
17. Rear Brake Relay Lever
18. Propeller Shaft Slip Joint
19. Clutch and Brake Pedal Shaft
20. Clutch Throw-out Shaft
21. Booster Brake Lever Shaft
22. Disc Brake Shoe Operating Shaft
23. Disc Brake Cross Shaft
24. Brake Cross Shafts

— Use recommended grease.

25. Steering Gear Case — Use recommended transmission oil.
26. Propeller Shaft Universal Joints — Use recommended transmission oil. *Do not use grease.* Remove pipe plug; insert Alemite fitting in hole and force oil out of vent plug on opposite side. *Replace plug.*
27. Transmission
28. Differential

— Inspect every 1000 miles and keep transmission oil up to level of oil filler plug. Drain and refill with new transmission oil every 5000 miles.

Every 2000 Miles

29. Oil Filter — Remove and clean every 50 hours of dump truck service and every 200 hours for trucks in transportation service.
30. Pinion Housing — Replenish with one quart recommended transmission oil. The pinion bearings are lubricated by oil splashed by differential gears.

Every 3000 Miles

31. Front Brake Camshaft and Crank — Use recommended grease.
32. Front Brake Cables — Use graphite grease having 5% or more graphite.
33. Front Wheel Bearings — Remove wheels, clean hubs and repack with recommended grease.

Every 5000 Miles

34. Rear Wheel Bearings — Remove wheels, clean hubs and repack with recommended grease.
35. Booster Brake Cylinder — Remove pipe from either end of booster and inject two ounces of light engine oil. Remove rear clevis pin and turn piston over several times. Do not pour oil in the atmospheric inlet, as this retards the air entering and drips on rubber piston guard, eventually destroying it. The external valves require no lubrication. In cold weather, thin the oil with equal part of kerosene or use penetrating oil.

A Lubrication Chart for Two Models of International Motor Trucks

to neglect, but is more likely attributed to a poor lubricant having been used, resulting in a change of the source of supply.

ESTABLISH ROUTINE LUBRICATION

Instruction books of various truck manufacturers indicate the frequency certain parts of their trucks should be lubricated, ranging from 500 miles to 5,000 miles or more. Such recommendations usually are sufficient when they are adhered to, in conjunction with accurate records which may be kept of each service, but frequently it is impracticable to maintain such records in the field, which encourages negligence greatly to the detriment of the equipment and frequently entails a large monetary loss, which may be avoided by establishing a definite time for a complete inspection and lubrication of all parts. When practicable, it would be an economic policy to lubricate thoroughly all moving parts once each week, with the possible exception of wheel bearings, which should be thoroughly cleansed and repacked at least once a month. The time which would be required for such servicing would be an investment for the truck owner which would return him large dividends.

Many truck operators depend to a considerable extent upon their oil pressure gage to determine when their engine oil should be replenished. This is frequently misleading as the gage may indicate full pressure even when the oil may be dangerously low. The oil indicator should be inspected at least twice daily and the oil supply kept to the full level as shown by the indicator. Such a practice insures a longer life to the oil, permits greater mileage between oil changes, and assures greater lubrication efficiency for the engine, reducing the wear on pistons, cylinder walls, rings and wrist-pins to a minimum.

ALWAYS USE THE BEST LUBRICANTS

The investment involved in truck equipment is sufficient reason to warrant the owner to protect it to as great an extent as possible, through the selection and use of the better grades of lubricants. This recommendation can not be overstressed, regardless of the size and type of each unit. The best grades of oils and grease lubricants are obtainable at but a slight advance over the cost of "ordinary" lubricants, and when computed on the consumption per ton-mile the additional cost is negligible. The better grades of oils and greases not only last longer, requiring a smaller quantity for replenishing purposes, but their superior lubricating properties protects the bearing parts against excessive wear and early repairs and replacements, which in itself justifies the small additional investment in the original first cost.

VARIED SERVICES IN WHICH MOTOR TRUCKS ARE OPERATED BY CONTRACTORS

1. A fleet of 3-batch trucks well maintained by daily servicing. 2. An unusual operating condition in a creek bed requiring special attention to lubrication. 3. Loading a GMC truck in a sand and gravel pit where fines are liable to creep into the bearings unless they are sealed with grease. 4. Heavy excavation hauled by a White truck where overloading is a constant occurrence. Selective lubrication is most important in heavy hauling.

CARE OF THE ENGINE

Owing to the tendency of engines to overheat in the summer months, it is advisable to use a heavier grade

of oil than during the colder winter months. They are less susceptible to the heat conditions than the lighter oils and retain a better lubricating body under the higher temperatures to which they are subjected. The lighter grades should be used during the colder months as they possess a lower cold test, permitting easier starting. The lighter oils are handled more expeditiously by the oil pump and distributed to the various working parts almost instantly, insuring immediate lubrication. Owing to the many types, sizes and makes of motor trucks, it is impossible to make definite recommendations which would apply to each. The operator should be guided by the motor truck manufacturer's recommendations in this respect.

The Transmission and Differential

The proper lubrication of transmission and differential gears of motor trucks is an important factor in truck operation, as they carry a greater load per square inch of bearing surface than any other moving part. Extreme care should be exercised in selecting a correct lubricant for the purpose stated, procuring one capable of withstanding excessive pressures without breaking down, but sufficiently fluid to flow freely to all bearing parts. If a grease lubricant is used it should be semi-fluid in consistency and manufactured from the best oils and other ingredients obtainable, to insure against thinning out during the hot months of summer. It should retain a sufficient body under heat to maintain a strong film between the contact points of the gears when in mesh and under heavy loads or hard service. Such a lubricant should be of a somewhat lighter consistency for the winter months and have a cold test sufficiently low to insure against channelling at —10 degrees F. and permitting free gear shifting at that temperature.

Keep a Good Film of Lubricant on the Gears

For the lubrication of hypoid or worm gears, a high grade lead-base or extreme-pressure lubricant should be used to obtain the best possible results from the standpoint of efficiency and economy. These types of lubricants are of a more fluid character than the grease lubricants referred to above, but are manufactured with a heavy-bodied oil which, combined with the base materials, makes them sufficiently adhesive to form a strong film over the teeth of the gears and protect them from metal to metal contact. They are capable of withstanding the maximum pressure to which they may be subjected without breaking down. These lubricants are rapidly finding favor for all types of gears, and are sufficiently popular to have recently invited cheap imitations into the market which are of much inferior quality and do not merit the claims made for them. They are being offered at very attractive prices which should cause suspicion to be cast upon them. Only well-established brands should be used to insure the results which are desired, regardless of such additional cost as may be involved.

Proceedings of the American Toll Bridge Association

THE *Proceedings* of the American Toll Bridge Association, including the papers and reports presented at the annual convention of the Association held in Cincinnati in January, 1934, has recently been published by the Association. The papers cover such subjects as a survey of the toll bridge industry, the history of Kentucky state toll bridges, toll bridge traffic and trends, bridge insurance, the planning of bridge plazas and toll houses, and methods of estimating traffic for toll bridges as well as a number of committee reports.

Copies of the *Proceedings* may be secured from the American Toll Bridge Association, 1024 Vermont Ave., Washington, D. C. Price: $1.00.

$200,000,000 Highway Fund Apportioned to the States

THE highway appropriation authorized by the Hayden-Cartwright Act, signed June 18, 1934, by President Roosevelt for highway construction under the provisions of the National Industrial Recovery Act has already been apportioned by Acting Secretary of Agriculture Tugwell. Following the requirements of the law, seven-eighths of the fund is apportioned under three divisions of equal weight based upon the area, population and rural post-road mileage of the several states and Hawaii. The remaining one-eighth, as provided by law, is apportioned according to population.

The money is immediately available for allotment to construction projects on the Federal Aid highway system and its extensions into and through cities and on important secondary roads. The law requires that, in the absence of satisfactory reasons to the contrary, not less than 25 per cent of the apportionment to any state must be applied to secondary or feeder roads, including farm-to-market roads, rural free delivery roads, and public school bus roads.

The amounts apportioned to each state, Hawaii and the District of Columbia are as follows:

	SUMS APPORTIONED		
	Seven-Eighths According to Sec. 21 of the Fed. Hwy. Act	One-Eighth According to Population	TOTAL APPORTIONMENT
Alabama	$3,722,613	$537,229	$4,259,842
Arizona	2,553,507	88,428	2,641,935
Arkansas	3,051,561	376,488	3,428,049
California	6,779,637	1,152,569	7,932,206
Colorado	3,275,724	210,282	3,486,006
Connecticut	1,128,642	326,226	1,454,868
Delaware	875,000	48,395	923,395
Florida	2,363,274	298,069	2,661,343
Georgia	4,523,020	590,471	5,113,491
Idaho	2,187,138	90,348	2,277,486
Illinois	7,372,261	1,549,140	8,921,401
Indiana	4,431,497	657,466	5,088,963
Iowa	4,616,722	501,639	5,118,361
Kansas	4,735,803	381,872	5,117,675
Kentucky	3,287,509	530,802	3,818,311
Louisiana	2,537,276	426,656	2,963,932
Maine	1,549,697	161,889	1,711,586
Maryland	1,478,833	331,225	1,810,058
Massachusetts	2,487,737	862,737	3,350,474
Michigan	5,469,502	983,066	6,452,568
Minnesota	4,905,029	520,522	5,425,551
Mississippi	3,132,202	408,025	3,540,227
Missouri	5,436,923	736,817	6,173,740
Montana	3,660,592	109,142	3,769,734
Nebraska	3,684,616	279,748	3,964,364
Nevada	2,283,870	18,486	2,302,356
New Hampshire	875,000	94,462	969,462
New Jersey	2,400,426	820,453	3,220,879
New Mexico	2,855,760	85,940	2,941,700
New York	8,772,350	2,555,571	11,327,921
North Carolina	4,197,326	643,615	4,840,941
North Dakota	2,800,745	138,222	2,938,967
Ohio	6,515,630	1,349,382	7,865,012
Oklahoma	4,198,747	486,433	4,685,180
Oregon	2,904,181	193,633	3,097,814
Pennsylvania	7,635,476	1,955,312	9,590,788
Rhode Island	875,000	139,572	1,014,572
South Carolina	2,417,958	352,996	2,770,954
South Dakota	2,906,984	140,659	3,047,643
Tennessee	3,771,790	531,201	4,302,991
Texas	11,108,746	1,182,507	12,291,253
Utah	2,029,590	103,101	2,132,691
Vermont	875,000	73,007	948,007
Virginia	3,273,714	491,673	3,765,387
Washington	2,789,019	317,393	3,106,412
West Virginia	1,929,280	351,055	2,280,335
Wisconsin	4,345,174	596,663	4,941,837
Wyoming	2,241,919	45,793	2,287,712
District of Columbia	875,000	98,842	973,842
Hawaii	875,000	74,778	949,778
Totals	$175,000,000	$25,000,000	$200,000,000

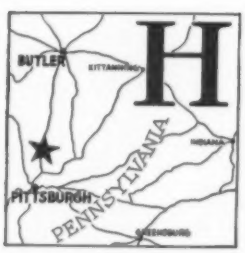
Brains Save Brawn

on

Concrete Paving

With Some Machinery Eliminated

Contractor Develops New Methods to Reduce Costs



HIGHWAY construction has been a life-saver in absorbing large quantities of unemployed labor among the able-bodied. Contractors have still found it necessary to use their heads to find ways of cutting costs in the operation of their outfits so that the slim possible profits of present-day contracts can be preserved. The Hagedorn Contracting Co., Inc., of Butler, Pa., which had the contract for the construction of 2.63 miles of 30-foot reinforced concrete pavement on State Route 72 near Pittsburgh, Pa., last summer showed very well how speed can be developed even when some of the most effective construction equipment is ruled off the job by the Federal specifications. Not one of these contractors who today are doing without this equipment would omit it as a part of his operating unit if he were not required to by the specifications. The lessons which he has learned during these times when the road job has been the backbone of legitimate unemployment relief will be of great help to him in working even more economically when he can reinstate the machines on the job. This has been a challenge to the highway contractor which he has met with his chin up and well defended.

The section on which this contractor operated was located in Hampton and Richland townships about 15 miles from Pittsburgh, Pa., and consisted of 30-foot pavement with a cross section of 10 x 8 x 10 inches. The grading for the work was subbed to the Vang Construction Co. of Pittsburgh. The rough grade was left 0.2 feet high according to specifications.

Fine Grading and Form Setting

The contractor worked two complete gangs, each carrying on for 10 hours a day. Number 1 gang worked the first three days of the week and Number 2 gang the second three days leaving Sunday in its proper perspective as a day of rest except when emergency repairs were required. A Cletrac 40 pulling a Caterpillar Super Special grader with a 9-foot blade shaped up the rough grade for the first fine grade crew which consisted of ten men. The grade was left quite uniformly 1 inch low as the contractor figured that it was cheaper and speedier to have the hand shovelers build up the grade by shoveling from the shoulder than it was to have them using picks to cut the grade to the proper elevation. The forms were set by a form setter and helper on each side of the road with two men back to line them up for the final insurance against an uneven surface to the slab. The first fine grade gang included the men who cut the trenches for the forms and also trimmed the grade. A Buffalo-Springfield steam roller of 10 tons weight was used ahead of the forms to insure a firm grade and a Buffalo-Springfield 5-ton gas roller was used between the 8 and 10-inch Blaw-Knox steel road forms for compacting the final grade. The second fine grade crew which worked between the forms consisted of sixteen men. The last man in the subgrading crew oiled the forms.

The Concrete Organization

The contractor experienced some difficulty in organizing his concrete crews as the labor groups he had used for several years, mostly negro labor, had scattered, and with the required use of local labor furnished by the local unemployment relief organization, he had to build up two complete new concreting crews. He succeeded in doing this in rather quick time by choosing the more adaptable men for the key positions.

There were two men dumping the batch trucks as they backed to the paver. Just ahead of them three men dumped the cement from the six bags on each batch and another man baled the bags for return shipment daily to the producer. Immediately back of the Smith 27-E paver two men operated the scratch board which gave the final check to the grade before placing the concrete. The expansion joints were set as specified at intervals of 100 feet or more using a ½-inch steel plate and Elastite premoulded joint material. The steel man who placed the Truscon center joint keys against the 8-inch form and drove the dowels every 5 feet assisted the concrete foreman in placing the expansion joint. At joints the first dowel was set 1 foot from the joint, the second

dowel 2 feet 1 inch from the first dowel and then the standard 5-foot spacing. The expansion joint was covered with a piece of wet burlap as the strike-off for the lower course of concrete was pulled over the joint riding on a wooden riser placed on either form. The riser was held in place on the forms by cleats on either side which fitted snugly to the forms. The Cleveland concrete strike-off left a smooth plane of concrete 1½ inches below the top of the forms for the placing of the Truscon Type A wire mesh.

Although this was a 30-foot pavement the contractor poured it as a 20-foot strip with a premoulded clef-type longitudinal joint in the center and then a 10-foot strip poured later. The batching plant was located at the center of the job with the cement house on a knoll so that the batch trucks could drive on the grade and receive the six bags of cement per batch. The cement house was located on the side of the road where the 10-foot strip would pass immediately in front of it. The paving was planned so that the 20-foot slab would be poured from the northern end of the job to the batching plant and then from the southern end to the plant. Following this the 10-foot strip was poured with the paver running on the 20-foot slab. Three-inch timber mats were placed transversely under the paver crawlers and extended 3 feet beyond the treads. The paver was run 3 feet in from the edge of the concrete.

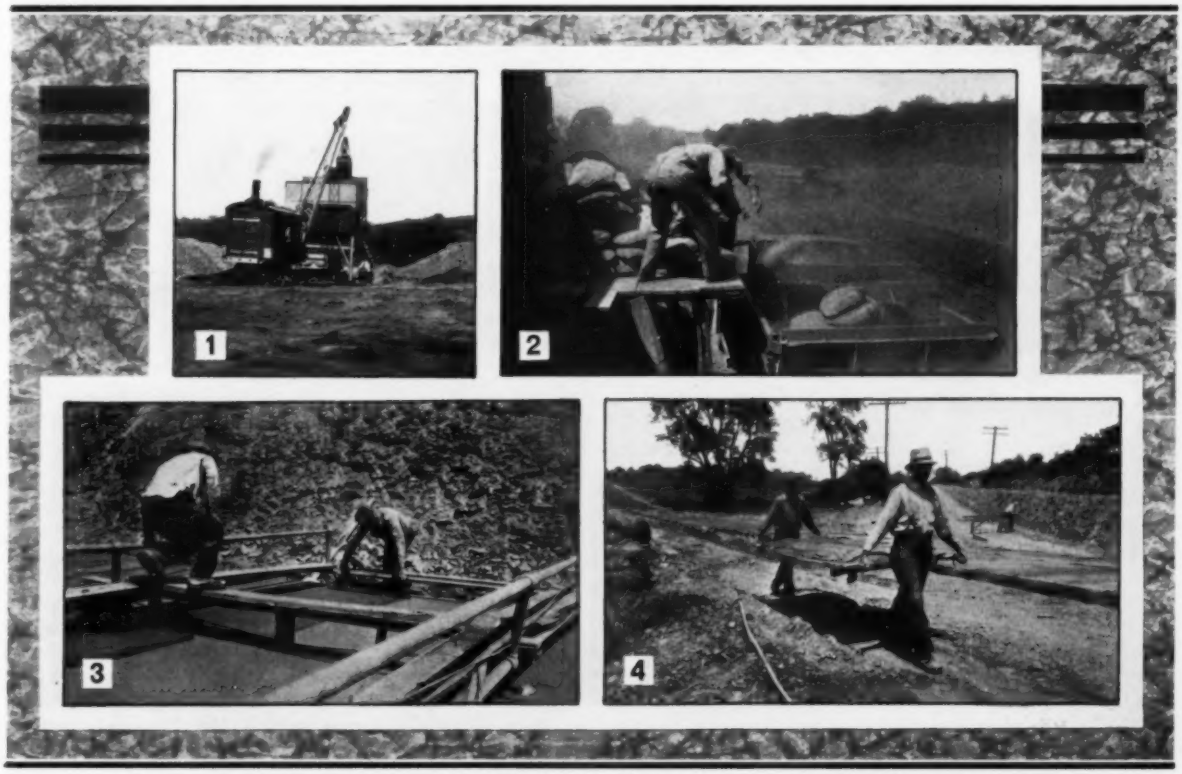
There were four pit men, two spaders and one man shoveling to the strike-off of the Lakewood finishing machine. One man handled the operation of this machine which was equipped with two screeds, the front one crowned and the second flat for super-elevated curves. A canvas belt on the Lakewood machine was used on the last pass of the machine over the newly poured slab and on the first pass the Lakewood cutter wheel for the center joint material was used.

A Heltzel Cleft Plane machine followed after the hand finishers and carried one man who was well protected from the hot sun by a frame covered with burlap. The center joint machine also carried a drag of burlap to erase the smooth finish developed in hand finishing around the premoulded center joint material. As a true line of center joint material is desired in the concrete as the work is completed and as it is very liable to take up waves and kinks after it is removed from the shipping crate unless it is cared for particularly well, the contractor provided a small box on the Cleft Plane machine for the storage of the material that was to be used at once. It laid flat in the box and therefore did not develop any waviness.

Two hand finishers worked just ahead of the Cleft Plane machine. Two other men handled finishing of the edges as well as of the expansion joints. They used 4-inch paint brushes to take out the smooth appearance of the edge of the slab where the edging tool was used to make the fillet.

CURING METHODS

As soon as the Cleft Plane machine had passed a given point, the burlap men spread the double thicknesses of burlap over the slab. The burlap was brought up from the rear, after it had been on the slab and wet for 24 hours, by two men who used a slat and wire litter with slings over their shoulders and sections of old rubber



A FEW DETAILS OF THE CONCRETING OPERATIONS ON THE HAGEDORN CONTRACT

1. *The steam crane and batching plant.* 2. *Speedy loading of bag cement on the batchers.* 3. *The pipe rolling-bridge from which burlap was placed.* 4. *One of the litters for handling wet burlap.*

hose to spread the pressure as the rope went over the top of the shoulders. They spread the burlap on platforms set at intervals along the shoulder and there they were sprinkled so that the burlap would be wet when placed and thus not cause any hair-checking of the green slab. The regular burlap men picked up the burlap from these platforms two or three at a time and folded each piece to 11 x 3½ feet and placed it transversely of the road slab from the form to within a half inch of the center. This work was done from a 4-wheeled bridge made up of galvanized 2-inch pipe which gave a sturdy structure for this work. As soon as several pieces of burlap had been placed transversely of the slab, leaving an uncovered section in the center this strip was covered with doubled burlap. The burlap was wet down for the 24 hours.

The following day the center burlap was removed first and the center joint material, which had been set about ¼-inch high, was cut off with a concrete spader so that it set flush with the top of the slab. Then the remainder of the burlap was removed and carried forward and the slab covered with about 3 inches of straw and cured by wetting down for 8 days. The crew which spread the straw consisted of a foreman and eight to ten men who also sprinkled, pulled the forms and shoveled dirt against the exposed edge of the slab. The removal of chopped straw from a road job is always a thankless task. This contractor figured that the same straw could be used for curing the 10-foot slab and so when the time for the removal of the straw from the 20-foot slab arrived and the paver was to be run on the wider slab, the straw was pushed over to the far side of the wide slab and left there. The loss through blowing away and through moving was not so great but that there was plenty of straw left for the curing of the 10-foot slab.

WATER SUPPLY

Water for the paver and for sprinkling the slab during curing was supplied through a 2-inch pipe laid along the shoulder the entire length of the job on the side away from the 10-foot slab so that it would be out of the way and less liable to be damaged. A Worthington and a C. H. & E. triplex pump, one at each end of the work, furnished sufficient pressure pumping against each other. Taps were inserted every ten lengths of pipe or at 200-foot intervals for the paver hose connections and for sprinkler hose. The paver carried 180 feet of Goodyear Type J hose which the contractor reports lasts about three years.

As a means of saving water on the job the contractor has a series of signs "Sprinkle to Here" which are put at the limit of the pouring 8 days before. The signs are shifted each morning with the approval of the inspector.

BATCHING PLANT AND CEMENT HOUSE

Both sand and crushed stone were purchased by the contractor delivered to his stockpiles direct by the producers. The sand came from the Iron City Sand & Gravel Co. and the crushed limestone from the Pittsburgh Limestone Co. The cement was delivered in freight cars to a siding in Allison Park, Pa., and trucked to the contractor's cement house alongside the batching plant.

An Osgood steam crane with a Blaw-Knox ¾-yard clamshell bucket supplied the aggregates to the Butler batching plant. The batches consisted of 1,890 pounds of stone and 1,236 pounds of sand for the 6-bag batch. The 3-batch trucks drove up to the batching plant, received their three batches of aggregate and then drove out onto the grade and the four men in the cement house tossed on the six bags of cement for each batch. The cement house had two wide doors in each side with a loading platform at each door on the side facing the grade. At one end was the contractor's office and telephone.

This organization produced batches delivered to the grade as mixed concrete at the rate of 27 per hour at the start. Within six days this had been raised to an average of 36 per hour and the contractor aimed continuously to increase this output to the theoretical maximum.

"GREASE IS CHEAPER THAN BREAKDOWNS"

This is the motto of the Hagedorn Contracting Co. and it applies to the grade and type of grease as well as to the fact that the grease must be applied to the equipment properly and at the right intervals. Every machine on the job is thoroughly lubricated at night and important parts also during the day. For the tractors and all high speed gears D-A lubricant is used. Three kinds of cup grease are used for other lubrication, one for the Alemite gun lubrication and two stiffer greases for use where higher temperatures prevail. These greases as well as the Mobiloil B for the high speed heavy-duty motors are purchased from the Vacuum Oil Co. All exposed gears are lubricated with Texas Co. "Crater Compound," a sticky grease that keeps out the dust and grit that would cut the bearings. Mobiloil crank case oil is changed once a week on all motors on the basis of 60 hours work per week.

PERSONNEL

W. R. Ross was Superintendent for the Hagedorn Contracting Co. of Butler, Pa., on this contract and S. E. Michaels was Senior Inspector for the Pennsylvania Department of Highways.

Sixth Annual Bridge Awards

THE three most beautiful bridges of steel built last year are the Cedar Street Bridge over the Illinois River at Peoria, Ill.; the Shark River Bridge between Belmar and Avon, N. J.; and the Dr. John D. McLoughlin Bridge at Oregon City, Ore., according to a jury chosen by the American Institute of Steel Construction.

The Cedar Street Bridge at Peoria, which was judged the most beautiful in Class A, which included bridges costing more than $1,000,000, was fabricated and erected by the McClintic-Marshall Corp. for the City of Peoria. The Shark River Bridge, selected as the most beautiful among bridges of medium size, between $250,000 and $1,000,000 in cost, was fabricated and erected by the American Bridge Co. for the New Jersey Highway Commission. The most beautiful of the small bridges, the Dr. John D. McLoughlin Bridge over the Clackamas River at Oregon City, was fabricated and erected by Poole & McGonigle for the Oregon State Highway Commission.

Honorable mention was awarded to the South Tenth Street Bridge over the Monongahela River at Pittsburgh in Class A; the Shrewsbury River Bridge at Seabright, N. J., received honorable mention in the class of medium-sized bridges; and the Port Clinton Bridge over the Portage River at Port Clinton, Ohio, was given honorable mention in the class of small bridges.

Notes from a Levee Contractor

Standardization on Types of Equipment and Diesel Power Brings Profits

By

R. E. Swinney

Swinney & Coleman
Baton Rouge, La.

BELIEVING that the main factor in cutting down operating costs is the selection of the right equipment, we have standardized on certain kinds of equipment which we have found to be satisfactory, and we have one of the few all-diesel loading and hauling outfits on the Mississippi River. Last year we built the Batchelor-New Texas levee, under subcontract, which involved about 500,000 yards of dirt and a 500 to 1,000-foot haul. We had three Lorain diesel draglines of 1½-yard loading capacity, the buckets on these machines being specially built to our specifications. In December 1932 we purchased three Caterpillar diesel tractors and three LaPlant-Choate 12-yard wagons. The combination of this equipment proved very satisfactory and we later bought two more tractors and wagons of the same make. On this contract, we used two draglines to load the five wagons and the third dragline to dig stumps, cut the muck ditch, for rehandling and similar odd jobs. Our largest month was during November when we built 131,000 yards of levee with five tractors and five wagons, loaded by two draglines. We believe this to be a good record.

The Bayou Pump Which Dewatered a 6-Acre Pit in Two Days

Diesel Power

Aside from our gasoline-operated electric lighting plants, all our equipment is diesel-operated. It costs more to run a 1,500-watt light plant all night than it does to run the 100-hp diesel dragline which the plant illuminates. We hope next summer to install a small diesel light plant which will cost about a dime a night to run. This year we substituted crude oil from nearby oil wells for the distillate which we have been using for fuel for our diesel engines. This crude oil costs about 5 cents a gallon, including the hauling costs from the well to the job. As a diesel tractor burns about 30 to 35 gallons per shift of 11 hours, the fuel cost per shift is about $1.50, as against $10.00 for 65 gallons of gasoline per shift. This saving in fuel makes a large difference in the profits of a job.

Drainage of Pits

To pump out borrow pits, we use what is known as a bayou pump, so called because pumps of the same type are used in the rice country of Louisiana to pump water from the bayous into the rice fields. It pumps close to 3,000 gallons a minute, has a 12-inch outlet pipe, and is hooked up to a Farmall tractor. It never loses its prime as two turns of the flywheel starts water flowing. It pumped out a borrow pit of about 6 acres in two days. The pit, which in many places was 6 to 8 feet deep, had been made in 1892.

Keeping Equipment Running

On a levee job where work continues 24 hours a day, the main thing is to keep the equipment running. Unlike road jobs, where repairing is generally done at night in preparation for the next day's work, levee work must go on continuously and mechanical troubles are the bugaboo of every levee contractor. We have found that the best method is to secure old, experienced operators and make them responsible for their machines, as if they owned them. When an operator tells us that he needs a new part for repairs, we always order it immediately without any questioning or discussion, for we know that

he knows that machine. In this way we are able to keep each machine in almost as good condition as when it left the factory.

While our jobs run 24 hours a day, our equipment actually is in use 23 hours, as one-half hour is taken out at noon and midnight for lubrication and cleaning. Care in this important part of maintenance has contributed considerably to keeping our machines in constant running order.

In 1932 we rented two draglines to the government on an emergency levee job where we were paid for the hours worked and penalized for time lost on repairs. We lost only 3¼ hours out of 2,978 worked, due to good operators and the excellent condition in which they kept their machines.

RECENT WORK

We recently finished the Geismar levee, about 25 miles below Baton Rouge, starting the job on January 13 and finishing on February 26. Bad weather just about doubled the length of time required for this work. There is nothing unusual about our methods of levee building. We have standardized on our equipment, made the most of the economies of diesel power and plan our work with an eye to the profits.

Dredging Bucket Saved by Welding

A FRACTURED bail lug recently put the bucket of the dredge "Crest," owned by the Great Lakes Dredge & Dock Co., out of service. The huge bucket, with a capacity of 14 cubic yards, would have been costly to replace and making a new bucket would have meant weeks of delay. At the same time, repair by most methods presented considerable difficulties. It was decided, however, to make a new forging to take the place of the part which had been carried away and weld this forging to the frame of the bucket by means of Thermit welding.

The repair was made by an operator of the Metal & Thermit Corp., New York, with the help of a small crew recruited from the yard forces of the Great Lakes company. The new forging was first placed in position and carefully aligned. Then a wax pattern was applied and the next steps were the building of a sheet iron mold box, the ramming of the mold and the usual preheating, which in this case required six hours. The Thermit was then reacted and poured and after the weld had cooled thoroughly, the mold was removed and the job completed by cutting away the gates and risers. The bucket is now considered as good as new, so far as the repaired part is concerned, because the deposited steel has the same analysis and physical properties as the sections which it joins.

Twenty-one pounds of wax, 500 pounds of Forging Thermit and 5 barrels of molding material were used.

The New Bail Lug Thermit-Welded to the Frame of the 14-Cubic Yard Dredging Bucket

What Causes Explosives Accidents?

THERE were 67 miscellaneous accident reports filed with the Institute of Makers of Explosives in 1933. Analyses disclose that 23 persons were killed and 109 injured in the instances reported. The Institute, through its member companies, investigated the causes of these accidents, and the results are given below covering the fields in which civil engineering contractors are particularly interested.

In the road construction field there were two accidents caused by premature explosion where dynamite was used and three were injured and one killed. There was one pure accident with dynamite in which one was injured, one from an unknown cause where dynamite was used in which one was injured and one explosion of an old charge of dynamite in which one man was killed. In tunnel construction one accident was caused by premature explosion of dynamite in which five were injured. One was due to an unknown cause in which dynamite exploded and one was killed and four were injured. One was due to the production of monoxide gas in which a gas explosive was used and five were injured. One was due entirely to carelessness where powder was used as the explosive and five were injured. In the quarry field where dynamite was used, one accident occurred due to premature explosion, one to lightning, one to the fact that the workers returned too soon, one to an unknown cause and one to an old charge.

Almost without exception it may be stated that these accidents were the result of carelessness or lack of knowledge. There are proper methods of handling, transporting, and using explosives. Certain fundamental rules on the subject are published by the Institute as well as by individual explosives manufacturers.

Several hundred million pounds of explosives are used annually. Accidents are relatively few when the hazardous nature of the explosives is considered. Statistics show that many other apparently safer materials or conditions are responsible for more accidents than explosives. The explosives industry is constantly attempting to educate users so that accidents will be even less in the future.

In an address before the Mining Section of the National Safety Council in Chicago, last year, Theodore Marvin, Editor, *The Explosives Engineer*, made the following comments:

"The road to safety is a hard one to traverse. The maker of explosives who takes a jealous pride in his products might be discouraged by some of the faulty and unsafe practices used. Some of the more flagrant violators are those who use hammers, hatchets, picks or iron bars to open boxes; store explosives and detonators together; tamp charges with iron bars; use short fuse; overcharge or undercharge holes; maintain poor firing circuits; permit smoking or open lights around explosives; and dozens of other unsafe practices, all of which have been condemned continuously in many places. It is such violations of the best approved practices which cause the majority of today's explosives accidents.

"The full force of this (safety) effort cannot be utilized unless users of explosives whole-heartedly cooperate. . . . For the usual operator every single rule for the proper handling of explosives and blasting supplies—practices which would practically abolish explosives accidents if correctly followed—is available in printed form in the safety rules of the Institute of Makers of Explosives," 103 Park Ave., New York City.

Air Cleansing Prevents Premature Engine Expense

By
George M. Walton
Cleveland, Ohio

TOO little attention is paid by contractors to protecting the engines of mixers and pavers, tractors and other automotive equipment operating all day amid dust laden air. Seldom is it realized that these working conditions create the greatest possible menace to the longevity of any automotive engine. Engines can not and do not stand up under such conditions. It is all too easy for the air going to the carburetor to take with it such quantities of dust, dirt, grit and other foreign matter that the engine is bound to show early signs of serious wear.

Some of the largest fleet owners in this country, who watch and check every phase of truck operation down to the last tenth of a cent, have found that efficient air conditioning is one means of showing a real saving in truck operation, both in mileage and up-keep costs.

When a truck engine consumes a gallon of gasoline it also consumes 1,200 cubic feet or 8,400 gallons of air, or about 90 pounds of air to the gallon of fuel. Every truck operator knows that his trucks run on the proper mixture of gas vapor and air. Exclude the air or the oxygen it contains and there will be no combustion. But very few truck operators stop to think what it means to take that amount of air into an engine when the air itself is not in fit condition to be consumed. Air, strictly speaking, is never clean. It always contains dust, dirt and minute particles of grit and grime, all of which is being drawn into the power plants of trucks and other automotive equipment.

Dirt Causes Cylinder Wear

Dirt in the fuel mixture is almost always the primary cause of premature cylinder wear. Almost every reboring job can be traced back to the entrance of excessive dirt through the carburetor. It also is the contributing cause to the early formation of carbon and particularly hard silicon carbon, which is difficult to remove. Then too, it is the primary reason why oil becomes contaminated, for practically all of the dirt that gets into the oil comes into the engine with the fuel mixture.

The carburetor air cleaner is of vital importance to those who desire long, dependable and economical service from their motor vehicles. Dirt entering through the carburetor and mixing with the lubricating oil grinds away whenever the engine is running and is the principal cause of rapid wear of all moving parts such as pistons, rings and valves as well as the cylinder walls.

Types of Air Cleaners

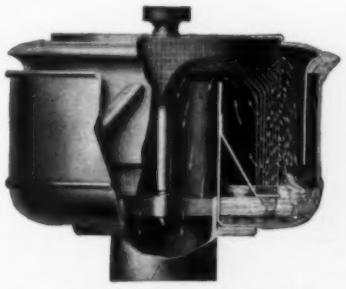
Air cleaners are made in three major types. These are identified as dry filters, dry centrifugals, and oil baths, the objective of all being the same—that of separating the dirt and fine dust from the incoming air. The efficiency of the air cleaner depends upon its ability to do two things well at the same time. It must filter all of the dust from the air and must not restrict the passage of that air to the carburetor.

The oil bath type, which depends upon a series of mesh screens divided by baffles, and which is illustrated in this article, has found favor with many large operators. In this cleaner the air is drawn through without impairment of engine power and the particles of dust and dirt are impinged upon the oiled screen. Oil is automatically thrown upon the screen from an oil bath housing and cleans the screen. This makes the filter self-cleaning and the oil bath needs changing only at infrequent intervals. Engines not originally equipped with a crankcase breather protector should be sealed with a smaller air filter at this point to assure exclusion of all dirt.

Results of Air Cleansing

A study of air cleansing by two large public utility operators gives the striking information that in one case in 1928 the cost per mile of operation was 9.94 cents without air cleaners which dropped to 8.19 cents in 1930 when the fleet of 400 trucks operating over 5,000,000 miles had been equipped with efficient air filters.

The second case in question was that of a division of the largest national fleet owner. This division, completely equipped with efficient filters, led the entire country in low cost of operation, which saving could be attributable only to the fact that air cleansing was in effect. This study was conducted over more than 14,000,000 miles of operation.



Phantom Section of an Air-Maze Air Filter

The Construction Machinery Distributing Trade Code as It Affects The Contractor

Trade Practices Clearly Defined in Article VII

THE Code of Fair Competition for the Construction Machinery Distributing Trade was approved on January 23, 1934. Of particular interest to our readers is Article VII on Trade Practices, most of which deals with the relationship between the distributor and his customer, the contractor. Because of this we are reprinting this article in full.

This Code, which was prepared by E. K. Hurst, Pres., Western Materials Co., Sioux Falls, S. D., Chairman of the Code Committee; Wm. H. Ziegler, Pres., Wm. H. Ziegler Co., Inc., Minneapolis, Minn.; and John C. Louis, Pres., John C. Louis Co., Inc., Baltimore, Md., all members of the A. E. D., is written in such a manner that it does not conflict in any way with the codes of the manufacturers of construction equipment in their relationship with contractors through direct sales.

Article VII—Trade Practices

The following practices constitute unfair methods of competition and are prohibited:

Sec. 1. Inducing or attempting to induce a breach of contract to which a member of the Trade is a party.

Sec. 2. Enticing or attempting to entice the officers or employees of a competitor to violate their contract of employment; provided, however, that nothing in this Section 2 shall prevent an employer from employing the employees of another employer.

Sec. 3. Paying or allowing secret rebates, refunds, unearned discounts or credits, either in the form of money or otherwise, or secretly extending to certain purchasers special services or privileges not extended to all purchasers on like terms or conditions.

Sec. 4. Paying or agreeing to pay, directly or indirectly, a commission or consideration of any kind, except to persons regularly employed in the seller's organization or to regularly established subdealers; provided, however, that nothing in this Section 4 shall be construed to prevent the allowance of discounts to customers as prescribed in the seller's published price lists and discount sheet.

Sec. 5. Accepting or offering to accept used machinery or attachments, used equipment, or other property in trade on the purchase price of new machinery or attachments, or allowing or granting credit, directly or indirectly, therefor; provided, however, that nothing herein contained shall be construed to prevent a member of the Trade from purchasing used machinery or equipment or other property as a separate and independent transaction.

Sec. 6. Selling below list price. No member of the Trade shall sell or offer to sell any new standard machinery, attachments, or equipment at a price lower or on terms more favorable than as stated in his published price lists, or price lists with discount sheets, if any, filed in accordance with Article IX; provided, however, that damaged, obsolete, non-current, and distress construction machinery, attachments, or equipment may be sold at such prices as are necessary to move the goods into buyers' hands, but only after filing with the Code Authority at least ten (10) days in advance of such sale a list showing the quantity and description of such machinery.

Sec. 7. Quoting a lump-sum price on two or more pieces of equipment which does not show unit prices, or making additions or deductions on any other basis than the unit prices shown.

Sec. 8. Making or offering to make any guarantee on machinery as to material and workmanship more liberal than the printed or written guarantee of the manufacturer of such machinery.

Sec. 9. Accepting orders for future delivery subject to cancellation, except such orders as are contingent upon conditions affecting the purchaser, which conditions shall be clearly stated in the order; provided, however, that after sixty (60) days from date of order no competitor shall be estopped under Section 1 of this Article VII from attempting to sell the purchaser machinery in lieu of that covered by such contingent order.

Sec. 10. Misrepresenting the facts about a competitor or the goods which he sells.

Sec. 11. Misrepresenting the facts about one's own company or the goods which it sells.

Sec. 12. Quoting delivered prices or invoicing purchaser without adding, to the f.o.b. factory price, transportation and other charges, and failing to state in quotation, where freight is to be prepaid, that such prepaid freight will be charged as a separate item and billed net cash.

Sec. 13. Guaranteeing against advances and declines in prices of goods sold.

Sec. 14. Allowing more than ninety (90) percent of the net selling prices as credit on returned goods when the distributor or manufacturer is not at fault.

Sec. 15. Discriminating between purchasers by renting new machines or attachments at less than a reasonable rental price or by allowing any of the first two months' rental or more than eighty (80) percent of rentals thereafter paid or accrued to be applied as partial payment or reduction of the list or net selling price on like new equipment where the transaction is later converted into a sale.

Sec. 16. Selling a new machine or attachment subject to acceptance after trial; provided, however, that this shall not prevent making and completing a sale subject to performance in compliance with specific guarantees.

Sec. 17. Failing to require on installment sales at least twenty-five (25) percent cash payment before shipment or on delivery of the goods sold and the payment of the balance of the purchase price in monthly installments, the first installment to be payable in not more than sixty (60) days from date of shipment, the last installment to be payable in not more than twelve (12) months from date of shipment. All installments shall be evidenced by notes bearing date of shipment and bearing interest at the rate of not less than six (6) percent per annum from date of shipment until paid. No installment note shall be extended or renewed in whole or in part except for actual inability of the purchaser to make payments. No understanding for renewal or extension of any installment note shall be made prior to the sale of the goods to the purchaser. In the case of government or political subdivisions not less than twenty-five (25) percent cash payment shall be made not later than the first regular meeting of the purchasing body subsequent to the date of delivery; the balance of the purchase price may be spread over a period of not more than twelve (12) months from date of shipment and shall include interest at not less than six (6) percent per annum from date of shipment to date of payment.

Copies of the complete code may be secured from the Superintendent of Documents, Washington, D. C., at five cents per copy.

The Code Authority

The Code Authority includes the following: E. K. Hurst, Chairman; A. C. Blaisdell, Pres., Blaisdell-Folz Equipment Co., Cincinnati, Ohio, Secretary-Treasurer; Fred W. Mattheis, Pres., Hedge & Mattheis Co., Boston, Mass., Member; H. E. Stewart, Pres., Wylie-Stewart Machinery Co., Oklahoma City, Okla., Member; C. Taylor Handman, Pres., C. Taylor Handman Co., Cincinnati, Ohio, Member; W. W. Tangeman, Vice-Pres., Cincinnati Milling Machine Co., Cincinnati, Ohio, Administrative Member. The National Code Authority Office is located at 207 W. Pearl St., Cincinnati, Ohio.

Attention of distributors is called to the fact that a distributor can not receive the benefits of the Code in the event he files a complaint against any violating distributor and is not considered to be working under the Code unless he has filed a compliance form and paid his assessment. This is very important and distributors who have not yet done this are urged to do so immediately.

The Editor Comments

Personal Observations and Reflections

Hayden-Cartwright Road Bill a Stimulant

The Hayden-Cartwright Road Bill, H. R. 8781, has become Law. As finally passed, it makes immediately available to the states the sum of $200,000,000 as a 100 per cent grant for highway construction; $24,000,000 is set aside for Federal construction for roads in forests, parks, and Indian reservations; and it makes available at any time for emergency repairs on the Federal Aid highway systems, for damage caused by floods, hurricanes or earthquakes, the sum of not more than $10,000,000 of any money which has been appropriated by the Federal Government for highways. Federal Aid has been reinstated for the two fiscal years 1936 and 1937 with $125,000,000 available each year to be matched by the states. In these same two fiscal years the sum of $24,000,000 is appropriated for forest highways, roads on public lands, and in national parks and Indian reservations. Also of great importance is Section 12 of the Bill which states that after June 30, 1935, Federal Aid shall be extended only to those states that continue to use for roads at least whatever portions of their gasoline taxes and motor vehicle license fees are now authorized by law for highway purposes (including retirement of outstanding bonds for payment of which these revenues may have heretofore been pledged).

The restoration of Federal Aid places upon the states a greater responsibility for highway construction through the reinstatement of 50-50 Federal Aid. Since the program is set for three years, highway departments can plan their programs definitely. Contractors are assured that there will be highway construction for the next three years and thus will feel freer to purchase the new equipment necessary to economical production. Manufacturers of construction equipment and materials realize that their market is stabilized. And with the checking of further diversion of the gas tax, funds will be automatically provided for the states to take up their burden under the restored Federal Aid appropriation.

The American Road Builders' Association, and all others who have worked so diligently for the Hayden-Cartwright Bill are to be congratulated in the successful passage and signing of the Bill which assures stability to the highway industry and insures its future.

PWA Purchases in Open Market

There is going to be a lot of money saved through the recent removal of the restrictions on PWA purchases. Secretary Harold L. Ickes, Public Works Administrator, has ruled that all future non-federal projects shall be awarded solely on the basis of the lowest responsible bidders and also has abolished the buy-at-home restrictions. The rescinding order reads as follows:

"Since the rule as to local preference for materials not only has worked hardship in many cases but also has frequently caused delay in the Public Works construction program, Paragraph 9 (b), Section C. Construction Regulations, Bulletin No. 2, revised March 3, 1934, and the memorandum to State Engineers relating thereto dated October 23, 1933, are hereby rescinded and the local preference for materials clause in all Loan and Grant and/or Grant Agreements now executed is hereby waived.

"As to construction contracts already let, the enforcement of the clause will be optional with the applicants. Except as otherwise provided by law, all future contracts will be awarded solely upon the basis of lowest responsible bidder. Where prices, quality and quantity are the same, applicants may select any of the low bidders or may divide the orders as they desire."

The chief objections to the local preference order which has been rescinded are: (1) that all states and their subdivisions cannot consume all of the products which they produce and consequently must sell the surplus to other states and communities: (2) conversely states and their subdivisions cannot produce all that they need of certain products: (3) the buy-at-home orders are bound to cause retaliation which has already been seen in legislative action by Pennsylvania's prohibiting the use of supplies, equipment and materials on its public projects which are produced in states which prohibit the use of out-of-state products: (4) competition between producers in different states and sections is reduced or destroyed by the universal application of the local preference principle: (5) where competition is restricted, prices to consumers tend to be increased: (6) unemployment is bound to increase in a state when it cannot ship its products beyond its own boundaries: (7) the revenues in a state will decrease under such restrictions since taxes from the states' leading industries are bound to shrink: (8) such local preference regulations are particularly injurious during a depression because every state should be given the opportunity to develop its industries without artificial barriers.

Theodore Reed Kendall

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Partner's Right to Pay

The mere fact that a partnership agreement contemplates sharing of profits or losses equally does not imply that if one member puts in more time in the business than his associate, he is entitled to special compensation. This rule of law has been frequently declared by courts throughout the country. The reasoning of the courts was thus stated by the New York Court of Appeals in a recent case (178 N. E. 758):

"The services of a partner are rendered for the common benefit, * * * and the resultant benefit is divided pro rata as provided in the partnership contract. Those profits constitute, in the absence of other agreement, the stipulated reward for services to be rendered, and there is no right to other compensation based on the reasonable value of the services actually rendered. Inequality in the value of services rendered, even the fact that the services were extraordinary and that, at the time the contract was made, the parties did not contemplate that such services would be required in the course of the partnership business, would not alone justify the award of compensation outside the share of profits accruing to the partner rendering the services."

True, the court recognizes that a mutual understanding for special compensation may be spelled out of circumstances, an explicit agreement on the subject not being essential. But it is clear that a managing partner who expects special pay for his services should insist upon a definite written agreement.

When Contractor Is Liable to Third Parties for Defective Construction

While a Pittsburgh housewife was sweeping the porch of her husband's home, she came in contact with an iron railing and fell 4½ feet to the ground. She sued the concern which had installed the railing under contract with her husband. In an opinion filed May 11, 1931, in the case of Grodstein v. McGivern, 154 Atl. 794, the Pennsylvania Supreme Court decided that, if the railing was defectively installed, the housewife had a good damage claim, although she was not a party to the contract for its installation. Distinguishing between cases where a contractor is and is not liable to third persons for defective construction, the court said:

"The rule has been stated in simple terms to be: 'Where A builds, constructs or furnishes for B and under contract with him, A is ordinarily not liable to C, one not a party to the contract, for injury to C due to A's negligence in respect to the thing so built, constructed or furnished. There is no such duty of care owing by A to C as will support the action.' . . . The outstanding reason for nonliability in these cases is that the casual connection which must in all cases exist between the negligent act and the injury has been broken by the delivery or sale to the intermediate party. It is fallacious to think of this rule as unbending, for, although the present case appears to be the first of its kind coming before us, and calling for such classification, there is a well-recognized exception to the general rule, embracing many well-considered American and English decisions, which, in the terms of the above illustration, has been stated to be: 'A is, however, held to owe C a duty of care where, although C was no party to the contract, it should, under the circumstances, have been obvious to A that C would necessarily, in the natural course of things, be brought into contact with, or would use, the defective article or structure so furnished. A fortiori A will be liable where he knew that the thing was made or furnished for C's benefit and use.' . . . . The present case plainly falls within this exception. . . .

"The knowledge of defendants that the porch railing was for the use and benefit of Mrs. Grodstein as well as for her husband and other members of the family brings the case within the exceptional group above noted."

Bidder Entitled to Return of Deposit for Mistake in Calculating Bid

"Sorry, City," said a bidder on a sewer job, "but we find we made a miscalculation in computing our bid. We'd lose money at the price bid, and therefore withdraw our proposal."

"Sorry, Contractor," replied City, "but it is too late. We accept your bid. It would be violative of the rights of our taxpayers if we were to let you out of the bargain your bid gives us."

And so the controversy went to the courts.

The Michigan Supreme Court decided (Union & People's National Bank v. Anderson-Campbell Co., 240 N. W. 19) that not only did the city have the power, but it had the duty, to return the bidder's deposit. This decision was based on a showing that the bidder acted in good faith and notified the city promptly on discovering the mistake, and before the bid had been accepted. The court adopted its reasoning in an earlier case, where a bidder was held entitled to return of a deposit under similar circumstances:

"It does not appear that plaintiff's mistake has made the school building cost more than it otherwise would have cost. The school district, if placed back where it was before the bid, loses nothing except what it seeks to gain out of plaintiff's mistake. To compel plaintiff to forfeit his deposit, because of his mistake, would permit the school district to lessen the proper cost of the school building at the expense of plaintiff."

When Employees Fight

In an effort to "grab off some easy money," people occasionally make queer claims. For instance, consider the chap in a recent Illinois case who started a scrap with a fellow employee and was not able to get it stopped until he was himself severely mussed up. He tried to get satisfaction from their common boss, by claiming that he had been injured in the course of his employment, within the meaning of the local workmen's compensation law.

The Illinois Supreme Court decided (178 N. E. 886) that it was true that the injury arose out of and in the course of his employment, but that the injured man was not in a position to complain, because he started the fight. The court said:

"Injuries compensable are those arising out of the conditions under which the employee is required to work, and may properly include injuries arising out of a fight in which the injured employee was not the aggressor, when the fight was about the employer's work in which the employees were then engaged, but it is not within the intent of the act that an employee be protected against the consequences of a fight in which he was the aggressor, though the fight be over matters of the employer's work in which such employees are then engaged. The risk of injury in such a case cannot be said to be incidental to the employment, but rather the result of such employee's own rashness."

Hauling Penstock Pipe by Tractor and Trailer at Boulder Dam

Delivering World's Largest Pipe to Boulder Dam

BOULDER DAM is a project of superlatives. It is the largest structure in the world, with more yards of concrete, more tons of steel, more hydro-electric power developed, more water impounded, and more money expended than anything of a similar nature ever built by man. Naturally such a project presents many new problems and calls for much special equipment.

One of the special problems was the building and transportation of the penstock pipe which will convey water from the reservoir to the power house. Since this pipe ranges up to 30 feet in diameter, it was necessary to fabricate it as near to the job as possible so a plant was erected by Babcock & Wilcox about 1½ miles from the dam. The finished sections of the pipe weigh 270,000 pounds and are 24 feet in length. To transport them to the cableway across the river, a special trailer was furnished by the C. R. Jahn Co. This trailer has an overall width of 22 feet, and is supported on sixteen wheels mounted on eight axles and carrying thirty-two 28 x 14 Goodyear tires. Air brakes and special hydraulic steering are provided for each wheel. The pipe is carried on cradles covered with rubber blocks, and the trailer is fully reversible so that it can be hauled back and forth to the dam without turning.

Power to move this trailer is furnished by two Caterpillar Sixties which have been on the job at Boulder Dam since the road was started from Las Vegas to Boulder City. Although 185 tons is expected to be the maximum load which the trailer will be called upon to carry in hauling the pipe, it was loaded down with 196 tons of reinforcing steel for the test. The trailer itself weighs 41 tons, so the tractors were called upon to pull a 237-ton load from the fabricating plant to the dam, and met this test very satisfactorily.

The Construction and Use of Corrugated Metal Pipe Culverts

AN 80-page booklet on the construction and use of corrugated metal pipe has been published by the American Road Builders' Association. This Bulletin No. 41 points out the advantages and limitations of pipe culverts, how to design and construct them, and how to obtain the best results with them at a minimum cost. The scope of the report is such that, while most of it applies to all small drainage structures, it is directed particularly at corrugated metal pipe culverts, the inherent values of light weight and ease of installation of which have made them a prominent factor in the drainage field.

The report covers the design of such drainage structures, their construction, uses, and also contains an appendix covering such subjects as proposed standard specifications, use and design of headwalls, bank erosion prevention, underpasses, conduits, drainage gates, culvert strength studies and similar subjects, as well as a bibliography.

Copies of this Bulletin No. 41 may be secured gratis from the American Road Builders' Association, National Press Bldg., Washington, D. C.

New River Bridge at Manistee, Mich.

A NEW river crossing for U. S. Route 31 in Manistee, Mich., has recently been completed. The structure consists of a double leaf bascule span of the Scherzer rolling lift type, and deck girder construction, with one 69-foot approach span of the deck steel girder type at each end of the bridge. This provides a 40-foot roadway and two 6-foot sidewalks. The approach spans have a concrete slab floor and a separate concrete wearing surface. The bascule spans have an asphalt plank wearing surface on a creosoted timber cross tie and plank deck.

The abutments are of the counterfort type with curved wings supported on concrete foundation piles with the footings well above water level. The bascule piers are of the skeleton type built of reinforced concrete and supported on timber foundation piling. The bascule piers were built inside steel sheet pile cofferdams which were later modified to constitute permanent fender piling and protection work. The clear channel between fenders is approximately 120 feet with a clear height above water of approximately 30 feet.

This new Manistee River Bridge is on a 90-degree angle of crossing and has an overall length of 328 feet. This structure is of particular interest because of the design of the roadway break, but is of sufficient height so that counterweight pits are not necessary This bridge was built by the Strom Construction Co., with the R. C. Mahon Co., subcontractor for furnishing and erecting the structural steel, and the Love Construction & Engineering Co., subcontractor for the foundations. The total contract price for the structure, including cement and aggregates, was $270,926.57.

Team Work in Hauling Concrete Buggies Up a Ramp to Pour an Abutment

How the Other Fellow Did It

Ideas That Have Already Proved Helpful to Contractors

Plan the Distribution of Your Equipment

313. In order to make profits on present-day grading, contractors must plan more closely than ever to use equipment effectively and economically. On an Indiana job where a contractor worked four grading outfits, he kept the steam shovel and the wheeler outfits working in adjacent cuts and fills so that one 10-ton gas roller could shuttle between the two outfits and thus save the expense of a roller for each section of the job. Similarly a second wheeler outfit and a crawler dump truck outfit were usually kept close enough to share the use of another gas roller. This is a far more important division of time than many contractors will be willing to admit. Think back and figure the time that you had a roller standing idle on a grading job and a second roller standing idle on the same work, when a little thought as to the distribution of their use would have made the second roller unnecessary. More important yet, if you had to rent the second roller, that daily expense could have been saved. 26.6.14

A Safe Way to Shore a Trench

314. Many serious accidents have resulted from improperly shored trenches. A little precaution will in most cases prevent cave-ins and consequent injury to fellow workers. The following rules will be found helpful in reducing the accident hazard on trenching jobs. In hard, compact ground, other than running, saturated or unstable material, trenches more than 4 feet deep should be shored with 2 x 6-inch planks, vertically against the side walls of the trench, opposite each other and at frequent intervals, throughout the length of the trench. Whenever possible, shoring should extend to the bottom of the trench and should be throughly braced either with screw jacks or by timbers placed at right angles to the shoring, cleated or wedged rigidly.

To guard against running material, use sheet piling adequately braced. This should be not less than 2 inches thick for trenches between 4 feet and 7 feet deep and for trenches more than 7 feet deep, not less than 3 inches thick. All shoring and jacks should be inspected periodically to see that no slack has developed.

Do not place excavated material nearer than 18 inches to the edge of the trench. This also applies to pipe, tools, etc., which might fall upon the workers in the trench. Frequently, in climbing in and out of trenches, workers support themselves or climb on shoring braces. This practice should be strictly prohibited, as many accidents have resulted. When removing braces, always remove the lower braces first, leaving the upper ones until last for your own protection. PH. CR. 4.34

Checking the Accuracy of a Large Batcher

315. A single batch for a 5-yard truck mixer on a New York State job consisted of 7,094 pounds of sand, 5,819 pounds of coarse stone, 5,371 pounds of fine stone and 3,196 pounds, or the equivalent of 34 bags, of cement. With such a large batch, it was difficult for the state highway department inspectors to check the accuracy of the batcher. The contractor, therefore, cast a 3,171-pound test weight of concrete in an iron cylinder. To check the batch scales, this weight was hooked on and raised with a chain falls and the scales balanced, then the weight was removed and the batcher filled with material until the scales again balanced, after which the weight was hooked on a second time to check their accuracy for double the test weight. 26.4.22

Well-Planned Centering for 35-Foot Concrete Span

316. In the building of a long concrete bridge over a Maryland River, the contractor built six sets of forms for the caps and six sets for the spans, including the centering, so that as soon as one of the spans was ready, one of the sets of forms was dropped and carried forward on a barge to the next span to be poured. The centering consisted of two 30-inch I-beams suspended from the caps by a pair of 10-inch x 30.2-pound ship channels spaced 6 inches back to back and measuring 6 feet 10 inches long. The channels ran to the center of the caps and carried two 2-inch rods 4 inches apart which ran through to a 2-inch plate on which the 30-inch 110-pound I-beams rested. The I-beams ran the full length of the span with a 4-inch clearance at each end which was wedged to hold the beam firm. The I-beams carried eight pieces of 8 x 14-inch timber 24 feet long bolted to the beams, which carried the forms from the bottom of the bridge deck. When the time came to remove the forms a pair of barges lashed together was floated under the span with cribbing carried up to within 6 inches of the bottom of the I-beam. The two bolts at each end on the channels were then slacked off and the channel pushed back to clear the caps. Then a jack was set up on the top of the I-beam and jacked up against the forms just enough to loosen them so that they dropped with the I-beam onto the barges and were floated to the next span to be poured. 26.4.14

Shuttle Trucks and Grizzly Speed Gravel Loading

317. On some projects a contractor finds it possible to load gravel direct from a bank at the side of a stream or from the stream bed itself into trucks and haul the material to grade for a gravel foundation course. One Virginia contractor found too many cobbles and oversize stones in the stream bed so it was necessary to use some method of screening the gravel before it was hauled to the road. He experimented with a bucket loader which did not prove successful, so built a wooden bin at such a height that the hauling truck could back under it for loading. Then a ramp was built from ground level to the top of the bin up which two shuttle trucks backed and dumped their loads onto a grizzly made of scrap iron with rods and pipe spacers. Oversize rolled off into a horse-drawn wagon and was dumped nearby. 26.3.25

Two Devices for Tunnel Checking

318. During the construction of the newest Baltimore water tunnel, which was built in rock and lined with 84-inch reinforced concrete pressure pipe throughout, it was necessary check the tunnel section carefully to be sure that the neat line of rock was the full specified 6 inches from the outside of the pipe. The contractor's engineers devised a simple template which, when mounted on an industrial car on the industrial track which was concreted in the invert of the tunnel, occupied the exact location of the pipe. From the periphery of this template, it was easy to determine whether the neat line was the full 6 inches required. Also for purposes of checking the amount of concrete to be placed about the pipe, another device was developed by city engineers. It consisted of a wheel with 36 spokes which gave the location of 36 radial stations for measuring the diameter of the tunnel at 2-foot intervals. By averaging these radii, a very close check was possible on the amount of concrete needed for any section. 26.5.15

Construction Industry News

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has announced the receipt by its St. Louis Works of a record order for Hollowspun concrete tapered piles, specifying delivery of 4,300 units, for Twin Locks No. 26 at Alton, Ill. This project is a unit in the development of the 9-foot navigable channel on the Mississippi River from the conjunction with the Missouri River to Minneapolis, the entire project being developed by the U. S. Engineers Corp. Approximately 138,000 feet of concrete piling will be used, the piling being driven into the river bed to support the lock walls.

Paul K. Fleming & Associates, 232 East Erie St., Chicago, Ill., are in a position to act as manufacturers' representatives in the central district for several lines of products. This firm has had twelve years of experience in municipal and industrial selling.

Chevrolet Motor Co., Detroit, Mich., has announced a reduction as high as $50.00 in most of its truck models, including the 6-cylinder ½-ton group and the 1½-ton group. Domestic truck deliveries for May were significant, showing an increase, and truck deliveries for the first five months for 1934 nearly doubled last year's figures.

Link-Belt Co., Chicago, Ill., has recently opened a warehouse at 413-15 Second Avenue, Dallas, Texas, where an extensive stock of Caldwell and Link-Belt conveying and power transmitting machinery will be carried. The company's sales office will also be located at the warehouse. E. G. Wendell is Resident Manager.

Austin-Western Road Machinery Co. has announced that its offices, as well as the offices of the new Western-Austin Co., a merger of the Austin Manufacturing Co. and the Western Wheeled Scraper Co., will be located at Aurora, Ill., after July 1. The Austin-Western Road Machinery Co. will continue to act as the sales company for the Western-Austin Co.

Republic Steel Corp., Youngstown, Ohio, has announced the appointment of L. S. Hamaker, its Sales Promotion Manager, to the position of Vice President and General Manager of the Berger Manufacturing Co., Canton, Ohio, a wholly-owned subsidiary of Republic. Mr. Hamaker began his career in the steel industry in the Sales Department of the Berger Manufacturing Co. and later was made Advertising Manager. During a series of mergers he became Advertising Manager of United Alloy Steel Co., Central Alloy Steel Corp., and finally of Republic Steel Corp. He was appointed Sales Promotion Manager of Republic in 1931.

American Steel & Wire Co., Chicago, Ill., has been appointed national distributor for the Smith metal laced joints for use in concrete pavements which are manufactured by the A. O. Smith Corp., Milwaukee, Wis.

American Cyanamid & Chemical Corp., New York City, has announced the acquisition, effective July 1, 1934, of the plant, properties and business of Burton Explosives, Inc., Cleveland, Ohio, which has, since its organization in 1930, been engaged in the manufacture and sale of high explosives and blasting supplies. The business of this company will be carried on as the Burton Explosives Division.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the appointment of W. R. Judson as Manager of the Salt Lake City District Office, located in the Kearns Building, Salt Lake City, Utah. Mr. Judson succeeds H. E. Weiss who has been transferred to the company's office in Kansas City. For the past three years Mr. Judson has been Managing Director of Allis-Chalmers (France), representing the Allis-Chalmers Mfg. Co. in Europe and prior to that, he was for 13 years Manager of the Chile office.

Highway Sales Organization, 845 So. Wabash Ave., Chicago, Ill., has been formed by an active group of individuals for the sale of materials and equipment of leading manufacturers in the highway field in the state of Illinois. Additional lines are desired.

Wellmann Engineering Co., Cleveland, Ohio, has announced that Harron, Rickard & McCone, of Los Angeles and San Francisco, Calif., which has for some time been distributor for Williams clamshell and dragline buckets in the San Francisco territory, will now handle these buckets in the Los Angeles district as well.

The Testing and Qualification of Welders

A PUBLICATION, which should be of interest to those concerned with the hiring of welders, has recently been announced by The Linde Air Products Co. The purpose of this 24-page booklet, which is entitled "The Testing and Qualification of Welders," is to outline simple tests for measuring the ability of welders, the first of the six essential steps in every procedure control for oxy-acetylene welding.

It is pointed out that welding technique differs somewhat with the materials to be welded and with the type of joint used, so that it can not be assumed that a man who can weld excellent joints in aircraft tubing can necessarily do as well in 20-inch steel pipe. Separate sections of the book discuss in detail the fracture test, the bend test, the tensile test, and the observation test. To round out the booklet, a summary of existing and pending qualification tests for welding steel plate and pipe are given.

Copies of this booklet may be secured gratis by writing to The Linde Air Products Co., 30 E. 42nd St., New York City and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

MOVING DIRT AT GRAND COULEE DAM

Two of the three Caterpillar diesel Seventy-Fives and LeTourneau Carry-All scrapers moving 11½ to 12 yards of dirt per trip on the R. Roland, Seattle, Wash., contract at Grand Coulee Dam.

A New Elevating Grader with Power Take-off

A Power-Controlled Elevating Grader

INCREASED operating economy, simplicity, lower first cost, less upkeep and full capacity under all but the most severe operating conditions, are claimed for the new power take-off, power-controlled elevating grader recently announced by Caterpillar Tractor Co., Peoria, Ill. The new model features power-operated controls; a 48-inch shaft-driven carrier; wide drum-type wheels; extensible axles; enclosed gear drives; and wheels, drive shafts, drums and belt rollers mounted on ball or roller bearings. Power is supplied to the carrier, operating controls and improved pan cleaner by a rear power take-off on the tractor.

The operator from his seat directly over the plow has an unobstructed view of the furrow, the belt, the wagons and the tractor driver, and can make adjustments of the plow and the carrier by a touch of his hand on the four power levers grouped within easy reach. This elevating grader is designed for use with the Caterpillar diesel Seventy-Five tractor, but may also be used with the Seventy, the diesel or gasoline Fifty or the Sixty. These new machines may be equipped with 19, 22 or 25-foot carriers, and, when so equipped have shipping weights of 17,300, 17,840 and 18,340 pounds, respectively.

Spreading and Finishing Bituminous Roads in One Operation

A NEW finisher which spreads and finishes in one operation has been developed by Peterson & Neville, Inc., 365 Dorchester Ave., Boston, Mass. This Nickerson road finisher can be used not only for spreading both hot and cold asphaltic pre-mixes but also for spreading stone and gravel.

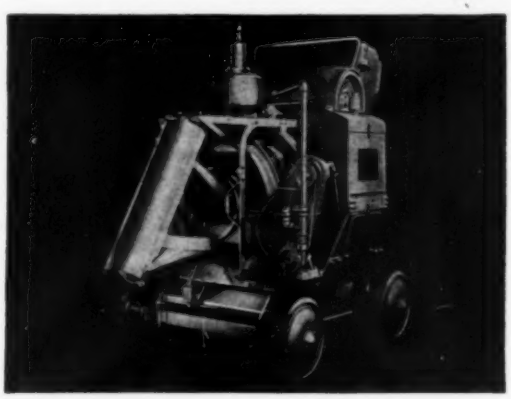
It is attached to a truck bringing the material to the job and is hauled forward while dumping, the entire operation of attaching, spreading and finishing a 10-ton load of material, and detaching requires less than three minutes, making it possible to handle a large amount of material in a day. The machine consists of a hopper which receives the material as dumped from the truck, and a plow with adjustable wings behind, which carries the material out to a maximum width of 16 feet. This plow is adjustable at three points for depth, so that with the nose raised slightly higher than the ends, any crown desired may be shaped into the material, or it can be flattened for banked curves. The whole is mounted on runners, 10 feet long, which prevent tilting, and bridges over any small inequalities found in the sub-base and surfaces over which the work is being done. Attachments for the machine make it possible to do shoulders and widenings 1 foot in width and wider.

The Nickerson Road Finisher Spreading and Finishing Amiesite on an Uneven Base

The shape of the grading edges enables this machine to handle materials so stiff and tacky that hand methods would be impossible, and the varying widths of city paving and the presence of manhole covers and similar problems in city paving are easily met.

A New End-Discharge Mixer

THE 7S and 10S Silverstreak end-discharge concrete mixer made by Construction Machinery Co., Waterloo, Iowa, is compact, being less than 7 feet wide, readily portable and is said to be the first end-discharge mixer with a substantial 4-wheel foundation which completely gets away from the usual crosswise trucks idea. Its construction is durable, there being two rail tracks encircling the drum, each rolled to an accurate circle with the drum turning on four mine-car-type rollers with flint-hard face and flange. The transmission is silent through a diamond-type high-speed roller chain running over machine-cut sprockets in a bath of oil.



The New Silverstreak End-Discharge Mixer

The interchangeable charging equipment makes it possible to use a pivoted power loader, batch hopper, or wheelbarrow charging platform and hopper. It is easy to change this equipment at any time in the field. In addition, the extended track loader is available for jobs where it is desired to elevate the mixer to pour directly into forms, yet permitting the skip to be charged on ground level. Every corner of the charging skip is rounded and smooth to permit quick, clean delivery of materials even before the skip has reached its full discharge position at an angle of 55 degrees.

One-man operation is possible by grouping the controls at one point. A thrust of one lever starts the skip on its way. Another controls the brake which positively regulates the downward movement of the skip. The third actuates the Duo-Phase water valve and one turn of the handwheel governs the movement of the discharge chute. The clutch is released and the brake automatically set instantly when the charging skip is fully elevated. This machine is equipped with split-hair water control, the Accurmeter being calibrated to a pint or pound of water. It is also equipped with a new very simple mechanism in the Mixometer for accurate timing of the batch.

Ask Your Tractor Dealer

Why It Pays to Use

D-A LUBRICANT
AND
D-A MOTOR OIL

Specialized Lubrication
for TRACTORS, TRUCKS
and All Heavy Duty Equipment

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Order from Your Dealer . . . He'll Make Immediate Delivery

00% PENNSYLVANIA LUBRICATION
Thruout Your Equipment

Tough going but "D-A" can Take it!

and it Saves You
10% to 50%
-on your Grease, Oil and Parts Bills

Made and Guaranteed by
D-A LUBRICANT CO.
INCORPORATED
Home Office, Main Plant
INDIANAPOLIS, IND.

The New Fairbanks-Morse Opposed-Piston Diesel Engine

A New Opposed-Piston Diesel Engine

LIGHT weight and reduced space requirements are features of the new opposed-piston diesel engine recently announced by Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill. The weight of this engine has been brought down to 20 pounds per horsepower and at the same time improved scavenging and a greater virtual stroke-bore ratio have resulted in improved combustion efficiency. The construction has been greatly simplified by a substantial reduction in the number of parts. Engines of the opposed-piston type are inherently balanced because the reaction forces of the two pistons in the cylinder oppose and tend to counteract each other, leading to higher rotative and piston speeds with a consequent reduction in weight.

Among the features of this new engine are two short large-diameter crankshafts with a synchronizing connection, making for compactness; the three functions of regulating injection timing, pressure and quantity centered in a single lever; rapid and accurate response; and the engine may be changed from idling to full speed in only a few revolutions or maintained indefinitely at any intermediate speed within very narrow limits.

These engines are available in five cylinder sizes, 5 x 6-inch, 6½ x 8-inch, 8 x 10-inch, 10 x 12-inch and 12 x 15-inch, and in 6, 7 and 8-cylinder combinations with a 5-cylinder size in the smallest bore. Power capacities range from 50 to 300 hp per cylinder or from 250 to 2,400 hp for the engine. While these engines were designed primarily for installations where weight and space are important factors, such as for mobile equipment, they are equally adaptable for stationary work.

A New Half-Ton Service Truck

THE new model C 1½-ton service truck has recently been announced by International Harvester Co. of America, Inc., 606 So. Michigan Ave., Chicago, Ill. This new model has a wheelbase of 113 inches and is especially suited for light service bodies. The construction is sturdy, with a deep frame reinforced by numerous cross members. The cam and lever steering gear, roller bearing anti-friction joints, hydraulic pressure-gun chassis lubrication and chrome molybdenum steel axle shafts are features which make for safety and economical operation.

The engine develops 78.5 maximum brake horsepower at 3,400 rpm. Low-cost engine maintenance and operation is facilitated by removable and replaceable precision-type main and connecting rod bearings, hardened exhaust-valve seat inserts, pressure lubrication, downdraft carburetion and an air cleaner. The bore is 3 5/16 inches and the stroke 4⅛ inches.

The 9-inch clutch is of the single-plate type, with built-in vibration damper. The transmission provides three speeds forward and one reverse. The front springs are 36½ x 1¾ and the rear springs, 51 x 1¾ inches.

Lubricating Construction Equipment

THROUGH a new lubricating device, known as the Graph-Air Gun, Microfyne flake graphite, manufactured by the Joseph Dixon Crucible Co., Jersey City, N. J., may now be used for all-purpose lubricating service.

The Graph-Air Gun, which is made of rubber, when squeezed deposits the graphite where needed in measured amounts through positively-controlled air pressure. The measured volume of the graphite is determined by the position of the nozzle in relation to the dial on top of the gun, so that when the nozzle is turned to a complete shut-off position, the gun may be carried with other tools without spilling graphite. The gun comes filled, ready for use, and when it is necessary to refill, the gun head is easily unscrewed, exposing a large opening through which is inserted the easy-pour chute spout which is attached to the refill cans of graphite. A 2-inch nozzle is standard with each gun but an 8-inch nozzle may be secured if desired.

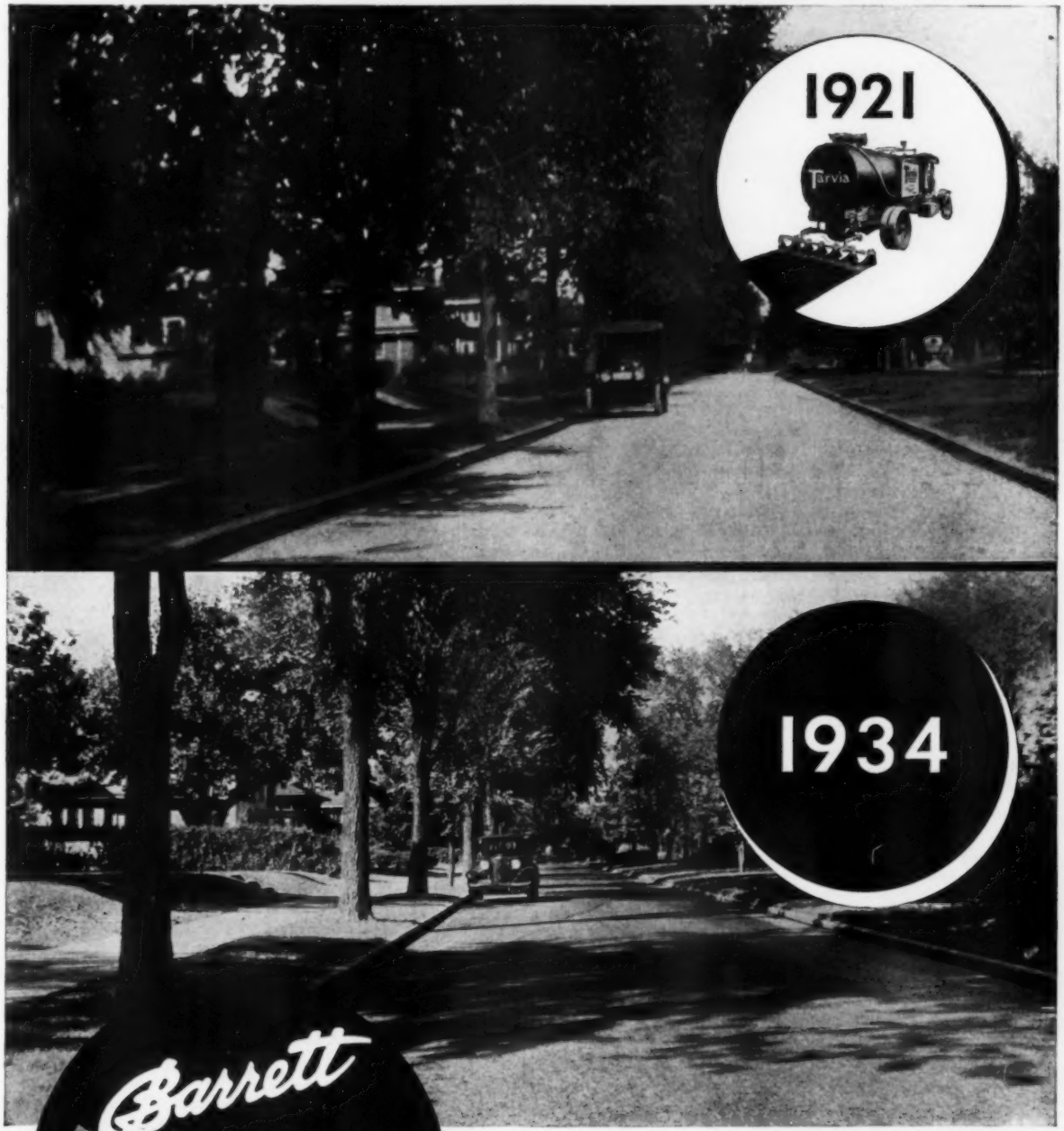
Microfyne graphite used by itself provides an oilless, greaseless, temperature-proof, combustion-proof lubrication on metal, wood, rubber, leather and other surfaces. It is also used as a co-lubricant with plain oil or grease. In combination, the graphite functions as an additional lubricating agent, making the lubricant rugged and lasting, and resulting in added protection to operating parts and reduction of power waste.

A 1934-Model Paver

THE 1934 model of the Rex Modern Drum paver has recently been announced by the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis. This improved paver is designed for fast, adequate mixing and is built with strength and resistance to wear for handling capacity batches on fast modern schedules. The Mechanical Man, a device which governs the seven operations necessary to get the mixed batch out into the bucket and the new batch in the skip into the drum is one of the features of this paver. All seven operations are handled mechanically, started when the operator steps on the foot pedal, and continued in order at the proper time by means of the governor booster. Other features of this new model are the Superhighway boom, 27½ feet in length with 25 feet of bucket travel, the modern high-carbon steel drum with replaceable alloy steel liners on its buckets and blades, high carbon steel drum tracks, wide drum rollers mounted on Timken bearings, modern drives, a fast and accurate water system and a 118-inch skip fully streamlined for fast sliding, with renewable liners to protect the skip throat from abrasive wear.

The 1934 *Rex Modern Drum Paver*

Dupont Avenue, South, Minneapolis, Minnesota, Tarvia-built in 1921. Thirteen years can make a big difference in shrubs and trees, but it hasn't changed the smooth, easy-riding, skid-safe quality of the Tarvia pavement.

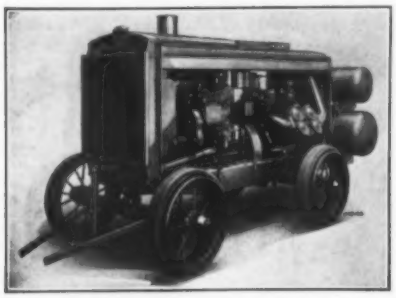


Barrett Tarvia
GOOD ROADS AT LOW COST

Tarvia is made by The Barrett Company, America's oldest and most experienced manufacturer of coal-tar road-building materials. It provides a wide choice of suitable low-cost surfaces for new construction or for improving and widening existing roads. With any sort of Tarvia pavement—from improved secondary roads to express highways—repairs and maintenance are low in cost, because they can be made simply and quickly. Ask the Tarvia field man.

THE BARRETT COMPANY New York Chicago Birmingham Philadelphia St. Louis Minneapolis Hartford Detroit Cleveland Boston Buffalo Columbus Milwaukee Providence Syracuse Lebanon Toledo Cincinnati Baltimore Youngstown Bethlehem Rochester Portland, Me. THE BARRETT COMPANY, LTD., Montreal, Toronto, Winnipeg, Vancouver

Please mention CONTRACTORS AND ENGINEERS MONTHLY—it helps.



The New I-R Oil-Engine-Driven Portable Compressor

Oil-Engine-Driven Air Compressors

THE line of I-R two-stage air-cooled portable air compressors, made by Ingersoll-Rand Co., 11 Broadway, New York City, has recently been doubled as all six sizes are now available with oil-engine drive.

The oil engine, known as Type H, is a 4-cycle solid fuel injection, spark-ignition engine, combining features of both the gasoline and diesel type of engine. It starts easily with a hand crank and operates smoothly with invisible exhaust. It has high torque at reduced speeds. The outstanding feature of these engines is the fuel cost savings resulting from the use of inexpensive fuel oils.

The six sizes of these compressors have respective capacities of 75, 125, 185, 250, 370 and 500 cfm.

A New Dirt-Moving Unit

A NEW piece of dirt-moving equipment which has a speed comparable to that of motor trucks and the carrying capacity of crawler tractor wagons has recently been announced by the Euclid Road Machinery Co., Cleveland, Ohio. This new unit, which is known as the Euclid Trac-Truk, consists of a powerful tractor, equipped with a Waukesha 6-cylinder gasoline engine, and mounted on four pneumatic-tired wheels, and an all-steel bottom-dump trailer of the usual Euclid heavy-duty body frame and door construction, and also equipped with two pneumatic-tired wheels. Six yards of pay dirt can be carried at speeds ranging up to 15 miles per hour and the short turning radius of the unit, approximately 13 feet, speeds up the work and saves time at the end of each trip.

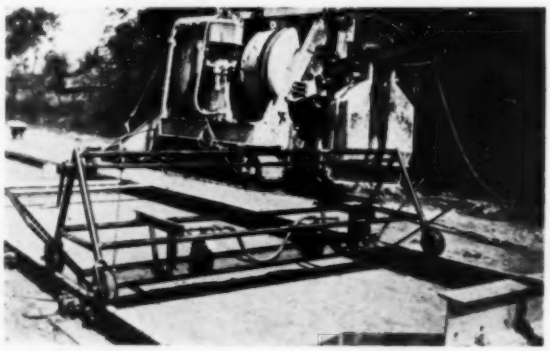
The tractor is provided with a sturdy transmission assembly, a differential and rear axle all designed to withstand severe working conditions, a final drive consisting of balanced planetary gearing which makes possible a speed range suitable for the fastest practical earth-moving speeds; a heavy-duty conventional truck-type steering mechanism supplemented for extra short turning by foot-operated steering brakes; and conveniently-located foot controls for clutch, brakes, electric starter and throttle. There is a heavy front bumper and guard protecting the radiator and a front pull hook for general purposes. The frame is heavy and rigid to withstand all twists and strains due to operation on rough uneven ground and the front axle and springs are of the extra heavy truck type.

The New Euclid Trac-Truk

The trailer wagon has a wide body for easy loading with a removable extension providing full body height for shovel or dragline loading. The wagon is dumped by a single jerk on the door trip lever and the doors are automatically closed by a single jerk on the clutch lever of the mechanical wind. The wheels are equipped with heavy-duty anti-friction bearings and the large size low pressure tires insure light draft even under soft ground conditions.

A simple and substantial flexible hitch provides play and shock-absorbing connection between the tractor and trailer under the severest operating conditions.

The entire gross weight of the wagon and load is equally divided between the two tractor driving wheels and the two trailer wheels. Easily-removable tire tracks for the two rear wheels of the tractor are provided for positive traction on soft or slippery ground and for protection to the tires when operating in rock.

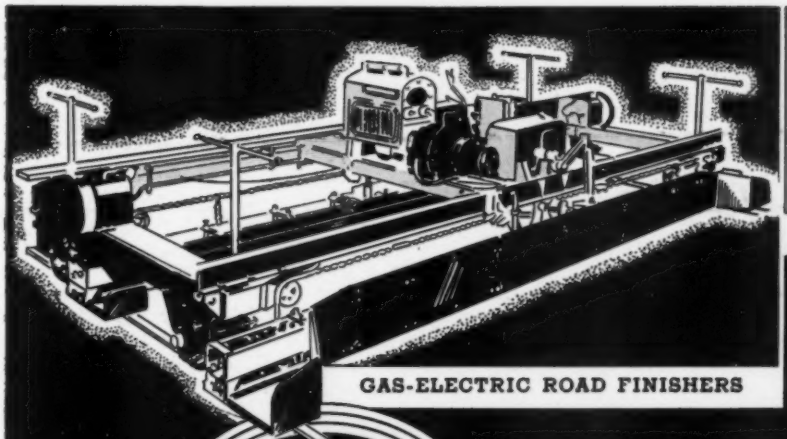


The Munsell Vibrating Screed Board Mounted in a Carrier Frame

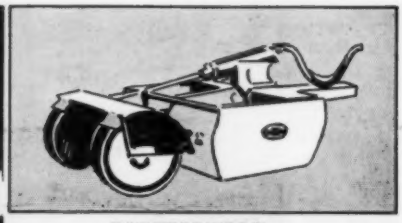
A New Development in Vibrating Screed Boards

A NEW development in the Munsell vibrating screed board for vibrating concrete slab has recently been announced by Munsell Concrete Vibrators, 999 West Side Ave., Jersey City, N. J. The screed board is suspended in a frame or carriage and is free to move vertically and, if so desired, to place the concrete in two or more courses. The screed board is of the pan type, 12 inches wide with curved edges front and rear. For a 10-foot slab, the screed board is 9 feet 10 inches long and rests directly on the concrete, not touching the forms.

The entire unit, including frame, vibrator and screed board, weighs approximately 600 pounds. The motion of the vibrators moves the frame on a flat or down grade at the rate of 7 to 10 feet per minute. The vibrating screed operates ahead of the finishing machine and where necessary, it can be pushed ahead by the finishing machine by means of a suitable attachment. The frame and screed board can be shortened to fit the gage of street railway tracks and be used in vibrating the concrete between and outside of the rails.



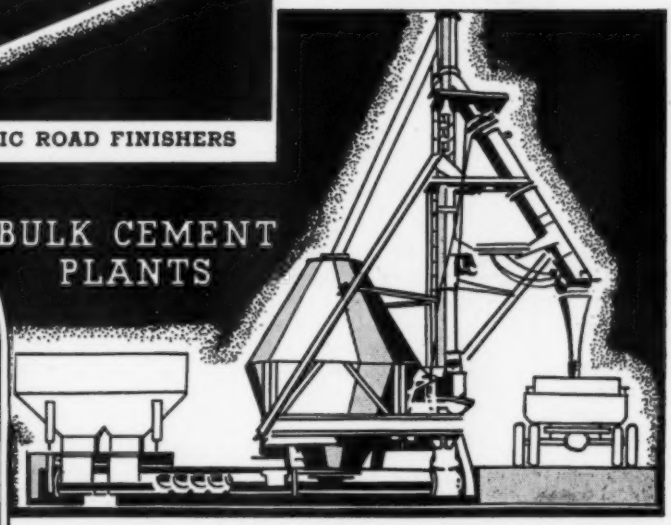
GAS-ELECTRIC ROAD FINISHERS



DIRTMOVERS

Headquarters for ROAD BUILDING EQUIPMENT

BULK CEMENT PLANTS

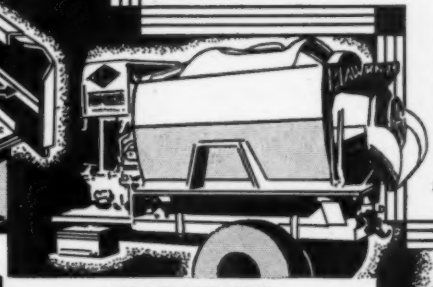


MORE than ever before, the Blaw-Knox 1934 line of construction equipment exactly fits contractors present and future requirements. New developments and amazing improvements in equipment are in step with projected programs and specifications.

Blaw-Knox equipment helps the contractor to maintain schedules and complete his work on time. It is low in maintenance costs and pays for itself quickly in service. It is modern and in many instances has anticipated specifications.

ROAD FORMS

BULLDOZERS



TRUKMIXERS

It's a twenty-eight year old custom among contractors to "deal with Blaw-Knox". This is an especially good habit to continue as it marks the maximum worth in equipment, satisfaction and service to be obtained for the dollar expended.

BLAW-KNOX COMPANY
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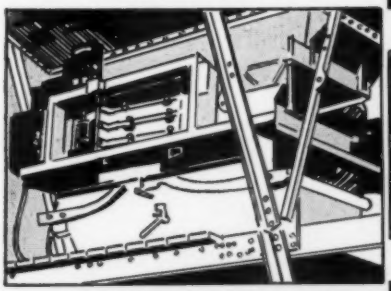
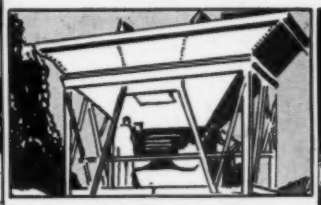


AUTOMATIC BATCHERS



BATCHERPLANTS

CLAMSHELL BUCKETS

BLAW-KNOX
LEADERSHIP
CONSTRUCTION EQUIPMENT
also includes:—
STEEL FORMS FOR GENERAL CONCRETE CONSTRUCTION
STREET AND SIDEWALK FORMS
TRUCK TURNTABLES
CEMENTANKS
TAMPING ROLLERS
PORTABLE ASPHALT PLANTS
CENTRAL MIXING PLANTS
READY MIXED CONCRETE PLANTS
TREMIE BUCKETS
STEEL BUILDINGS
STEEL GRATING

BLAW-KNOX

During July we hope you will remember to mention CONTRACTORS AND ENGINEERS MONTHLY.

The New Jaeger-Lakewood Finisher

A New Automatic Road Finisher

THE new Type D Jaeger-Lakewood automatic road finisher has recently been announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. This machine has a number of new features, including easy steering by means of one lever; an automotive-type transmission, using heat-treated chrome vanadium steel gears and shafts carried on Timken bearings and running in oil; drive direct to all four wheels from the two synchronized worm cases, holding the forms to line and grade and furnishing maximum tractive power for bucking piles and working on grades; and the Velvet-Touch finger-tip control.

Double equalizing connecting rods, with simple link motion, drive the 12-inch box-type screed smoothly back and forth and the new radius rod toggle construction gives a smooth straight-line motion to the front screed. The stroke is adjustable, 7 to 10 inches, and its speed automatically increases with the forward speed of the finisher. The screeds may be operated independently of each other and the operation is entirely automatic. By means of a lever, the screed comes up and stops in two seconds, another lever lets it down gently, with independent control for each screed. The design of the screed gives rigidity and holds the crown. Both front and rear screeds are fitted with reversible end shoes of sandwich metal. A single central adjusting screw, with a one-piece double-headed nut, easily changes the crown. The two smaller set bolts, which are underneath at the open ends of the screed, are on top of the main body of the screed, instantly accessible for leveling the bottom surface and taking out any warps.

Curve widening fixtures for the 9 to 10-foot size finisher provides extension axles which allow the machine to be used on curves widened up to 2 feet. A special front screed member to span the entire width replaces the standard screed when these fixtures are used. A hinged strike-off plate for attachment to the front screed member for striking off concrete below the forms is standard equipment. The plate can be furnished for any depth and swung up out of the way when finishing the slab. To meet special state requirements, this plate is spring-suspended and vertically adjustable when used on bituminous construction.

A motor generator set, mounted on the finisher frame, furnishes current for the vibratory motors which are mounted on the screed channels. The 20-foot finisher operates with three motors on the first and two on the second screed. The 10-foot machine is equipped with two motors on the front and one on the second screed or as specifications require.

The unit is powered by a 4-cylinder 10 to 15-hp plant, with throttle control. It can also be furnished with gas-electric power, consisting of a main engine directly connected to a generator, which in turn produces current for three separate motors, one for traction, one for driving the screeds and one for operating the mechanical screed lift. The Jaeger-Lakewood finisher can be furnished in widths from 9 to 30 feet, with all finishing combinations, including the single screed, single screed and tamper, tandem screed, and tandem screed and tamper.

A New Automatic-Feed Self-Rotating Drill

THE new Gardner-Denver D-89 Selfeed drifter has recently been announced by the Gardner-Denver Co., Quincy, Ill. These drills embody a new principle of self-feed, are vibrationless, with self-controlled positive action. The rate of feed is in step with the high speed with which the D-89 bites into the rock, and this synchronized action keeps the machine from feeding too fast or too slow. With the new features of this drill, it is claimed that an inexperienced man can drill as fast as an experienced one.

In an interesting drilling contest held recently in California, the fastest drilling time on a 5½-foot hole was 3½ minutes, made with one of the D-89 drifters. Each team of two men was required to set up, connect the hose, drill 5½ feet of 2½-inch bore hole in stiff rock and then tear down, the total time being taken.

A Transparent Surface Waterproofing

A TRANSPARENT water-repellent for absorptive surfaces, such as concrete, brick, concrete products, stucco and stone, is manufactured by the Johnson-March Corp., 52 Vanderbilt Ave., New York City. Klearkote is a scientifically compounded surface waterproofing, containing both mineral and vegetable materials, so colloidally dispersed that when deposited in the pores of an absorptive surface, it is rendered permanently water-repellent. It does not change the appearance of the surface treated and does not fill the pores but it does make the surface non-absorptive and water-repellent.

Klearkote is applied freely, preferably in two coats, the second following within five minutes. One gallon will cover from 10 to 15 square yards, depending on the absorption of the surface treated. As soon as it is dry and set, absorption has stopped and any remaining material on the surface should be wiped off.

Two Additions to Line of Scrapers

A 6 AND an 8-yard scraper have recently been added to the line of Le Tourneau Carry-All scrapers, according to an announcement from R. G. Le Tourneau, Inc., P. O. Box 1290, Stockton, Calif. These two new carriers are designed for use with 35 and 50 tractors. They are identical in design with the 12-yard Carry-All, except for their capacities. They are mounted on 46 x 20 x 10-inch tires, carrying an air pressure of 30 pounds.

These units are adaptable for use on highway construction, land levelling and similar dirt moving projects. For the 6-yard unit, yardages of 30 to 40 cubic yards per hour over a 1,000-foot haul are frequent, while for the 8-yard unit 40 to 50 cubic yards per hour over the same haul are made.

The New 6-Yard Carry-All Scraper